ELECTRICAL REVIEW

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Rural Electricity

American and British Experience

ALTHOUGH the United States is a country with greater "wide open spaces" than Great Britain, it is interesting and maybe profitable to study American rural electrification. The latest report on the subject was included in the recent address by Mr. C. W. Kellogg as president of the Edison Electric Institute, a post from which he is now retiring.

There is a familiar ring about Mr. Kellogg's statement that Government propaganda continued "with unabated zeal" to make rural electrification a subject of controversy between the Rural Electrification Administration and the electric companies and, by implication, to belittle what the companies had done. The utility companies began to push out their lines to rural areas about forty years ago and by the end of 1935 were serving about 789,000 farms. The long extent of line per customer proved an economic drawback and to overcome it the Government set up the State-aided Rural Electrification Administration in 1935.

Ten Years' Work

In the following ten years the R.E.A. connected 1,050,000 farms; in the same period the companies and other agencies added a further 1,181,000, so that at the end of last year of 3,020,000 farms connected only about a third were on R.E.A. lines. Though it appears that the electrified farms represent only a half of the total farms in the country, this does not give a true picture. In addition to these, nearly a million farms are already reached by existing lines but do not take the service; 300,000 are beyond practical reach; and a further 200,000 are either without buildings or their buildings are not occupied. This leaves only 25 per cent of the farms to be served and it is planned to complete this work within three years.

But this is not the end of the story: it will still remain to connect up those who, although the service is available, are not using it and to help existing and future farm customers to get more benefit from their service. Mr. Kellogg said: "The complete working out of these two objectives in their respective territories will be a full-time job for both utilities and R.E.A. without wasting effort in controversy."

Learning by Experience

He went on to remark that "interestingly enough the R.E.A. has lately been reported to be having difficulty in persuading some of the co-operatives it has financed to extend their lines into adjacent territory more sparsely settled than their own—their hesitation arising from the fear that in so doing they will dilute their own earnings. Truly, history does repeat itself!"

In this country, where the problems of distance are not so great, the power companies claim to have made electricity available by 1938 to 67 per cent of the premises in their rural areas; this is apart from the work of municipal undertakings whose areas, of course, are not so extensive as those of the companies. This has been accomplished without any form of State assistance, and yet the rates charged have enabled 90 per cent of the premises to

take the supply. The companies have a programme, interrupted by the war, which aims at providing electricity to every community of over 50 people, i.e., of more than twelve houses, within a five-year period when labour and material restrictions have been removed. Thus, while the circumstances in the two countries are not easily comparable, it may be claimed that we are not behind the United States in the matter of rural electrification.

The B.A. Again

IN its mission of keeping the lay public informed of the progress of science, the British Association was never more needed than it is to-day. Authentic information of what is scientifically possible guides the public in expressing its wants and also educates its sense of responsibility in the employment of what the scientist has to offer. Science is neither moral nor immoral, Sir Richard Gregory pointed out in his presidential address last Saturday: it is not the duty of scientists to dictate how their results shall or shall not be used. Certainly they should not stay their hand through fear of the abuse of their discoveries by those they purpose to benefit.

Dnieper Dam Contracts

MOST Russian matters are surrounded by mystery and obscurity and this applies to the contracts placed for the new Dnieper Dam plant. According to correspondents' reports the nine turbines are being supplied by Russian and American factories. Three of the generators are said to be on order in this country with a non-existent " British General Electric Corporation." We have made inquiries of the British companies likely to be concerned in such a contract but all of them deny any knowledge of the matter. As such an order possesses particular significance it would be interesting to have the facts.

Delays in Delivery

WE referred last week to the complaint of a firm of machinery makers regarding delays in the delivery of essential electrical equipment. The matter has been taken up in the *Manchester Guardian* by Mr. R. Milne (Milne & Longbottom, Ltd.) who gives four main reasons for the trouble. First, he says, their young men have been called up for the armed forces after specialized training and they cannot be replaced. Then there has been a shortage of certain raw materials, particularly iron castings and certain types of insulator; the former is being overcome by pre-fabrication, Owing to the enormous increase in the " motorizing " of machines the demand on the motor and control gear maker has been considerably increased. Finally, Mr. Milne blames the machine makers for not consulting the electrical equipment manufacturers at an earlier stage of production, instead of waiting until the machines are partly built up in their fitting shops.

Pooling Fault Data

OF almost equal importance to a free interchange among electricity supply undertakings of experience regarding system faults is the recording of the data on a uniform basis. The report form devised by the committee, representative of undertakings and manufacturers, which was set up by the Electrical Research Association appears to cover adequately ordinary incidents, while making provision for exceptional cases of technical interest. A valuable feature is likely to be the particulars furnished of action taken and suggestions for avoiding recurrence of trouble. Information will be obtainable from analyses made by E.R.A. concerning any type of fault, and progress reports are expected to be issued from time to time. Enlightened self-interest will no doubt secure the essential co-operation of the supply industry.

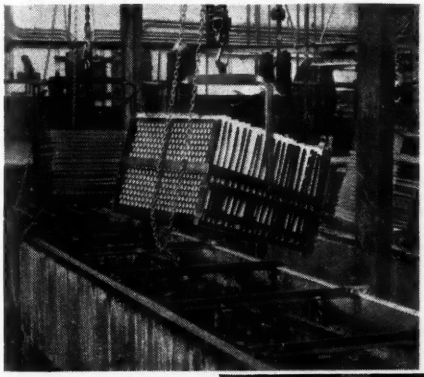
June Exports

IT was hardly to be expected that the phenomenally high level reached by exports of electrical goods and apparatus in May (£3,573,000) would be retained last month which, in any event, was shorter. Nevertheless the Board of Trade returns of export trade for June show that the value of shipments of this class were valued at £2,655,000, which was still above the total for April or any preceding month. Electrical machinery which reached £785,127 fell by nearly a million as compared with May (£1,702,401). Exports of machinery as a whole were valued at £7,651,000 in June as compared with £10,544,000 in May and £7,867,000 in April. Imports of electrical goods and machinery showed a sudden rise—from £177,120 in May to £455,143 in June.

Making Artificial Silk

Unusual High-Speed Drives

BY the courtesy of British Enka, Ltd., we were recently able to see at their factory at Aintree, Liverpool, the major electrical applications to the production of rayon yarn, which involves some particularly interesting high-speed drives. The factory has an overall installation load of about 3,000 kW, which is catered for partly from the public supply and partly by private generation.

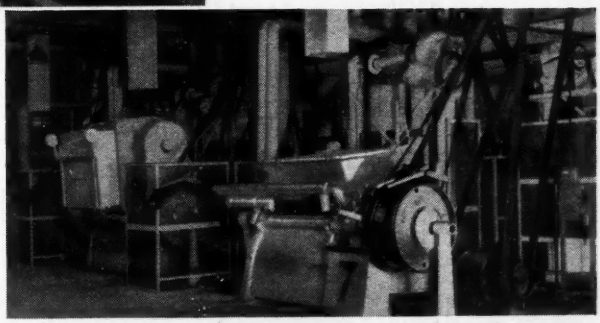


The viscoses are immersed in the lye tanks, while suspended from runways, and passed on to hydraulic presses

The installation load factor is about 73·5 per cent. In this article, however, we are more concerned with the actual production processes.

The essential raw material is wood cellulose pulp. This is brought largely from Canada in sheet form in about 4-cwt bales which are delivered at the incoming store by lorries from the Liverpool Docks. As required the bales are taken by battery trucks to the press room where they are opened up and the pulp is graded, weighed and cut to prescribed sizes by motor-driven guillotines. Predetermined quantities of the pulp are then made up into "viscoses" which are placed in special carriers or cradles suspended from an overhead runway and immersed in a steeping solution of caustic soda in lye tanks. The material remains in the cradles and suspended from the runways during the steeping process which reduces it, by partial disintegration, to a fit state for the subsequent processes. From the lye tanks the material is passed on to hydraulic presses by which a certain percentage of the solution is removed from the material.

The hydraulic pressure is provided by three-throw ram pumps, each driven by a 14-H.P., 470-r.p.m. squirrel-cage motor controlled by an oil immersed star-delta starter, and transmission is via pinion gearing with a speed-reduction ratio of about 5 to 1. After leaving the presses the viscoses are again weighed and taken to the first floor where they are chute fed into grinding or kneading machines on the ground floor. Each kneading machine is driven by a 22-H.P., 950-r.p.m. s.c. motor under star-delta control, and a belt transmission countershaft scheme is employed to the machine shaft, with a speed reduction ratio of about 3 to 1. From the machine shaft there is pinion gear transmission to the front and back kneading shafts which revolve at the different speeds of 31 r.p.m. and 21 r.p.m. By the action of the toothed revolving arms, inside the container, the pulp is torn into "crumbs" which, in the mass, look rather like snow, and the material is in a comparatively dry condition.



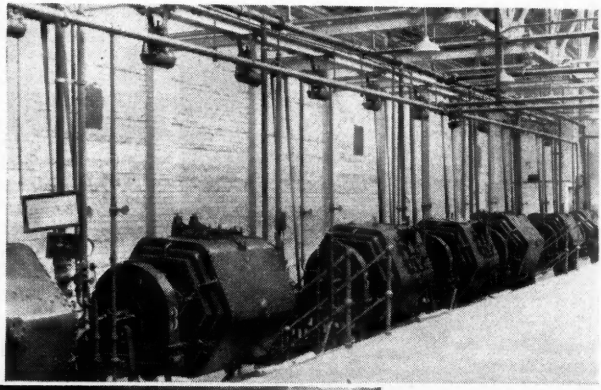
In the kneading machines the material is torn into crumbs

The containers are counterbalanced to provide for tipping when their loads are emptied into crumb tins, measuring about 18 in. by 14 in. by 10 in., in which the material is taken to the crumb room for a few days' ageing.

The tins are next conveyed to the mixing room where the crumbs are fed into churns in which carbon bi-sulphide is introduced. The churns operate on the simple milk-churn principle, the outer shell only revolving. They are arranged in two rows of seven machines in each row, and all the machines in both rows are driven by one motor. The driving motor and a stand-by unit, together with their control gear, are housed outside the churn room because of the possibility of an explosive atmosphere being created in the churn room. Each motor is a 15-H.P., 720-r.p.m. equipment, with star-delta control, and the actual driving motor transmits by belt to a line shaft serving one row of churns. There is cross-belt transmission between the two line shafts, and arrangements for readily bringing the stand-by motor into service, in which case the cross transmission is in the reverse direction. There are individual belt transmissions down to the churns which revolve at about $\frac{3}{4}$ r.p.m. A feature of the churn room is the ventilation scheme which embraces motor-driven inlet and outlet fans.

From the churns the crumbs are chute fed into large vertical stirring tanks immediately below on the ground floor, which tanks already contain the necessary amount of dilute caustic soda to effect solution. The agitation is continued until the crumbs are dissolved. The stirrer paddles are driven by a small " Handigear " motor unit directly coupled to the paddle shaft and surmounting each tank. The motor is controlled by a direct-on " Startet " push-button unit. During the latter part of the agitation the fluid in each tank is circulated vertically by a pump which is also used for finally pumping the solution to the viscose cellar for the next operation. This gear-wheel pump has a 7·5-H.P., 940-r.p.m. s.c. motor drive, and transmission to the pump shaft is a simple " Texrope " scheme.

In the viscose cellar the solution is received in tanks or kettles from which the air has been previously removed by means of



Right: One line shaft serves each row of seven churns.
Below: In the viscose cellar the solution passes in series sequence from kettle-to-filter-to-kettle, etc.

Perkington vacuum pumps, each of which is driven by a 14-H.P., 950-r.p.m. slip-ring motor with rotor-resistance control and

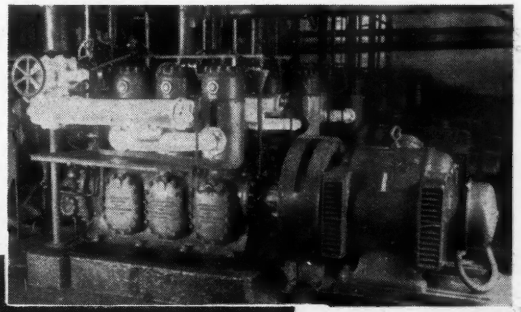
The solution is passed to the spinning machine from the cellar by compressed air

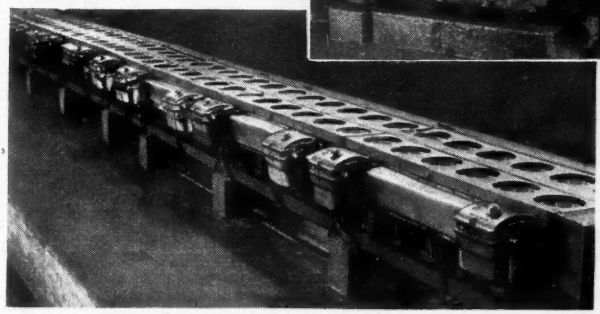
pinion gear transmission to the pump shaft. There are also filters in the viscose cellar, and the solution is passed through a number of kettles and a number of filters in an alternate series sequence of kettle-to-filter-to-kettle, etc. This operation is effected by compressed air at about 75 lb per sq in. supplied from compressors which are belt-driven by 80-H.P. s.r. motors with auto-transformer control. After its tortuous journey through the viscose-cellar plant the solution is passed along the main viscose pipe-line to the various machines in the spinning room.

Each spinning machine consists of about 60 operation units in line, and each unit receives the solution and delivers the material in solid thread form. At each unit the solution is picked up by a bracket pump, the speed of which is variable according to the speed of the shaft to which it is geared.

The pump unit meters the quantity of solution which it passes, and in each unit the solution is forced through a final filter and through a bent-glass tube at the end of which is fitted a platinum or gold perforated nozzle. The number of holes in the nozzle may be anything from 12 to 500, according to the class of yarn to be produced.

The nozzle projects into a bath of dilute sulphuric acid, heated to a given temperature, which coagulates the liquid. The viscose which is extruded through the nozzle into the acid is precipitated as filaments which float to the top of the acid and are picked up by a spinner and carried to a rotating shaft fitted with a stepped and serrated glass roller. As they leave the acid the filaments all unite into a loose yarn, without twist, which is passed several times round the



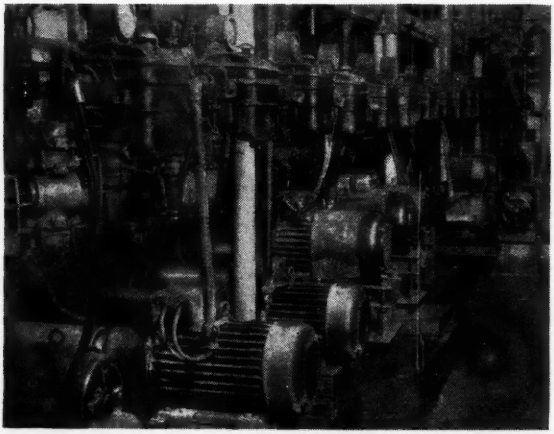


The "pot hydros" (below) are electrically "tied" in groups of six for switching. Ammonia compressors (Right) provide for the cooling by brine equipments in the viscose cellar

glass roller, and by this means the threads are stretched and thereby strengthened. Finally the yarn is passed down into a funnel at the end of which it falls into a spinning pot which rotates at 6,000 r.p.m., the thread being wound on to the inside surface of the pot under centrifugal force. By the reciprocating action of the funnel the thread is distributed over the whole area of the pot wall, thus forming a " cake."

During this operation the threads are also twisted. The time period required to form a cake is known as the race, which varies according to the weight (denier) of the thread. One of the more modern spinning machines has mounted at its end a vertical motor which drives from the bottom end of its own shaft the pump shaft, and from the top end of its own shaft the glass-roller shaft, in each case with worm and pinion gear transmission. The motor is a 2·5-H.P., 1,000-r.p.m. Newton unit. The pump shaft and the glass-roller shaft speeds are related according to the denier being spun and the spinning speed, the whole of the gearing being designed to this end. Newton 80-V and De Vyfe 40-V motors are used for the pot drives. They are supplied at 105 to 150 cycles from frequency changers which step up the frequency from the private-generation supply frequency of 105 cycles. The private generation is at 2,500 V, and transformers suitably placed in the spinning room and served primarily at this voltage step down to 80 V or 40 V, at which voltage they supply the pot motors through aluminium busbars which run longitudinally along the tops of the spinning machines, with reversing-switch take-offs to the individual motors. Again in the case of one of the more modern spinning machines, there are two 1½-H.P., 940-r.p.m. motor top drives which transmit through reduction gears to the camshafts serving the funnel guides.

At the end of the race the cakes are removed from the pots and conveyed to damping chambers in which they are subjected to conditioned air to prevent the salts from crystallizing. Later, in the cake-preparation department, the ragged ends are removed from the cakes, and after cleaning operations the cakes are lined with " Swansdown " insets and are then passed on to further damping chambers before they are subjected to bleaching and allied treatments by means of steam and various soap, acid and salt solutions. The bleaching plant embraces a comprehensive range of pumps to handle the liquors, and the pump motors vary in size up to 15 H.P. These motors are all s.c. machines, some Lancashire and some Newton, and they are all served by Ellison star-delta starters.



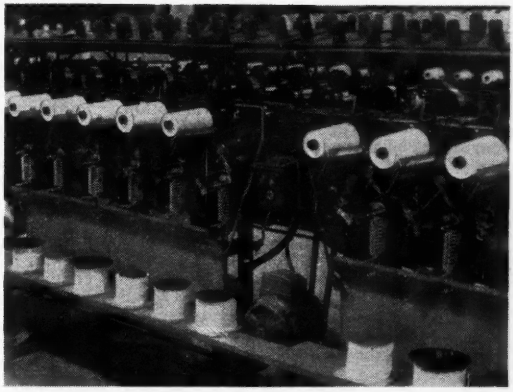
The bleaching plant embraces a comprehensive range of pumps to handle the liquors

After the bleaching operations the cakes are received by " pot " hydros in which the bleaching liquors are extracted from the cakes by centrifugal action. These extractors have similar drives to those of the spinning pots, and they are electrically " tied " in groups of six for switching purposes, i.e., one switch serves all six motors.

Following the extraction processes the cakes are dried in steam-heated ovens and then conditioned in a controlled atmosphere before they are passed on for coning. This operation is very similar to the normal textile operation, and from the cakes which are placed on spikes on shelves on the coning machine the yarns pass through various straining devices and guides on to horizontally disposed cones or spindles. Twelve spindles are driven by one motor by means of one continuous trans-

mission belt which engages all the twelve aligned spindle pulleys and has its circuit defined by suitably placed jockey and guide pulleys. The motor and spindle speeds vary from 840 to 1,080 r.p.m.

The temperatures in the crumb room and viscose cellar are kept constant by brine coolers which are served by Sterne ammonia-compressor equipments. Each compressor is directly coupled to a 45-H.P., 410-r.p.m., s.r. motor which is controlled by a drum-type contactor rotor starter. The brine is circulated by 4-H.P. motor-driven centrifugal pumps. Foul air is drawn out of the spinning room through two tunnels at the floor level by five fans, each driven by a 100-H.P. motor, and discharged to atmosphere, while a battery of 15-H.P. motor-driven fans pass fresh air into the room via steam heaters. Incorporated in the air-inlet pipes are water and air sprays which provide the necessary humidity for the spinning processes.



Twelve cones on each coning machine are all driven by one motor with a continuous belt transmission scheme

The motors for the hydraulic pumps, kneading machines, churns, stirrer pumps, vacuum pumps and compressors are all Lancashire Dynamo equipments, and the starters for these motors are Erskine Heap products.

Municipal Reports

Belfast

SALES of electricity by the Belfast undertaking were last year affected by the loss of the industrial wartime load. The city electrical engineer and manager (Mr. W. J. McGirvan) anticipates, however, that the inquiries and applications for power supplies now being received will compensate for this loss in the next few years. Excluding bulk supplies to the Ministry of Commerce and the Electricity Board for Northern Ireland (142·4 million kWh) the Electricity Department sold 231·8 million kWh in the year ended March 31st last, a decrease of 14·8 million on 1944-45. Supplies to shipyards, at 43·4 million, were down by 13·6 million kWh and general power supplies (84·6 million kWh) show a fall of 8·8 million. On the other hand domestic sales rose by 6·3 million to 54·7 million kWh. The number of consumers connected at the end of the year was 92,254, an increase of 4,052.

The Corporation's Harbour power station generated 282·5 million kWh, a decrease of 17·6 per cent. In spite of the inferior grades of coal used the overall operating efficiency created a fresh record for the station. No. 2 turbo-alternator, which was transferred to East Bridge Street as a war emergency measure, has been returned to the Harbour station as a house set. Provisional orders have been placed for plant for the proposed extensions at the station.

Revenue, at £1,552,537, showed only a small increase (£8,888) whereas working costs rose by £132,043 to £1,174,143. Against this, capital charges and sundry expenditure were down by £69,798. On the year's working there was a net surplus of £53,863.

Lincoln

The report of Mr. F. Newey, city electrical engineer and manager at Lincoln, records satisfactory progress with the extensions at the power station. Every effort has been made to expedite the work since the decision was reached last August on the controversial question of cooling towers. During the year the two 5,000-kW sets at the station were used to generate 13·1 million kWh, it having been necessary to run this relatively inefficient plant for long periods.

Electricity sales which in 1944-45 showed a decrease of 3·5 million kWh declined by a further 2·8 million to 51·6 million kWh, despite an increase of 10 per cent in domestic supplies. With peacetime production at factories getting into its stride, however, the demand at the end of the financial year had been restored to normal.

Income amounted to £229,122 (£225,403), working expenses being £190,024 (£179,412) and there was a net profit of £7,348 (£3,938.)

Views on the News

Reflections on Current Topics

MR. Shinwell is reported to have told the Parliamentary Labour Party that it might be necessary to raise the prices of electricity and gas to discourage consumption. This is " through the looking glass " with a vengeance. Throughout the war the Electricity Commissioners were engaged in persuading applicants for permission to raise charges that this was against Government policy; they are now apparently to discountenance price reductions, such as those just instituted by the County of London group, and even force undertakings to squeeze more out of the consumers. It seems strange that a Minister who has set himself up as a champion of these consumers should ever contemplate such a course.

* * *

Advocates of the nationalization of electricity supply and gas have based their arguments upon the alleged backwardness of the present authorities in developing their areas and lowering their charges. The falsity of these premises is demonstrated by Mr. Shinwell's suggestion. They are apparently developing too much and charging too little. With this tacit admission, what other reasons can be put forward to justify to the public a change in the present ownership? Possibly the answer is " co-ordination "—a beautiful prospect to planners but a trifle bleak for the public. But yesterday electricity was regarded by nationalizers as a necessity (as indeed it is) but now they propose to tell the public that it is a luxury for which they must be prepared to pay dearly.

* * *

There seems to have been a strenuous effort to be fair all round in some houses erected at Wakefield and Morley (Yorks) under the national competition organized by the House-Building Industries Standing Committee. In Type " A " " winter cooking is provided by the coal fire and summer heating by a gas cooker. Hot water is from the coal fire or from an immersion heater in the cylinder in the summer." On the other hand, in Type " B," " cooking is by electricity. Hot water is provided from the coke boiler in winter, or by a gas circulator." In both cases " bedrooms are heated by convection and by gas and electric fires."

* * *

Whenever I see a grain-drying plant, electric or otherwise, I am surprised that greater attention is not paid to the disposal of the moisture-laden air. In extreme cases, as for example, when grain has been damaged by water in a fire, the moisture content may approach 50 per cent in weight, yet this is usually discharged directly into the atmosphere of the drying shed or even recirculated. Sometimes the walls and ceilings of drying sheds, which have to be largely enclosed to avoid excessive heat loss and dust, are actually dripping with water. To find extract fans provided in the roof is rare, yet this comparatively small and inexpensive addition to the installation makes a very appreciable difference to the efficiency and economical running of the plant, not to mention the conditions under which the operators work. In the case of the multi-stage dryers there is of course an advantage to be obtained in re-circulating the warm air which is discharged during the later stage or stages of the process when the greater part of the moisture has been removed.

* * *

With the increasing adoption of prefabrication there have been several interesting developments recently in electrical wiring technique. A few weeks ago I mentioned the " Octopus " harness system under which the whole of the wiring of a house is supplied in a carton already cut to length and marked in distinctive colours for each room. Now I see that in America special floors are being supplied in unit form wired in such a way as to enable points for apparatus to be available wherever and whenever required at any part of the room. Another American innovation is a lightweight rigid steel conduit marked in inches and joined together with compression type couplings. The fittings are simply fitted on to the ends of the tubing and tightened with a spanner.

* * *

During last week's Commons debate on purchase tax the plight to which public men, in common with the lesser kind, have been reduced by the lack of laundry facilities was touchingly demonstrated by Sir Arnold Gridley. Speaking " more in sorrow than in anger " about the attitude of the Chancellor, he said that he" tried to get him to abolish the tax on electric washing machines and now that he does not propose to abolish it on hand washing machines, what is the poor housewife to do if she can get neither? " He suffered from the fact that his laundry was collected and returned only once every five weeks. He would do the weekly washing and mangling himself if only he could buy a hand machine or, preferably, an electric machine for use in his own household.—

REFLECTOR.

PARLIAMENTARY NEWS

By Our Special Reporter

Severn Barrage Scheme

ON July 16th, Sir Stanley Reed asked the Minister of Fuel and Power whether a decision had yet been reached on the recommendation of the expert committee's report on the Severn Barrage Scheme to construct a new tidal model, and to give the dock authorities the opportunity of being represented on a committee of hydraulic experts who would supervise the construction and operation of the new tidal model.

Mr. Shinwell said that no decision had yet been reached upon the committee's Severn Barrage Report.

Poles for Overhead Lines

Mr. Vane asked the Minister of Fuel and Power if he was aware that the Electricity Commissioners, in their circular instruction No. 950/1101 dated June 21st, had given their encouragement to the use of concrete poles for overhead supply of electricity; and if he would now also encourage the use of this material in rural areas as an alternative to wooden poles, where the cost was not prohibitive.

Mr. Shinwell.—Yes, sir.

Mr. Vane asked the Minister of Fuel and Power whether he was aware that the same Electricity Commissioners' circular gave priority of allocation of poles to newly-built premises; and why this preferential treatment was given to such premises when many applications in respect of older premises had remained outstanding through the war years.

Mr. Shinwell said that the provision of electrical facilities to new premises must for the time being have priority over existing premises which had alternative facilities, but every effort would be made to provide such facilities to existing premises as soon as possible.

Airfield Supplies

On July 17th, Mr. Osborne asked the Under-Secretary of State for Air if he would make electricity available to all the village houses in Strubby, Lincolnshire, from the aerodrome and speed up the general policy of sharing water, electricity and sanitation services with all villages in proximity to aerodromes which had such public services available.

Mr. Geoffrey de Freitas said that the supply of water and electricity at most airfields was provided by public utility authorities. The Air Ministry was always ready to consider suggestions for sharing any spare supplies once it knew what the authorities would like it to provide. It had had only two applications for electricity to be supplied to houses in Strubby; one had been approved, the other was being considered. As a matter of fact the Ministry might be unable to help much more in that way at Strubby if the airfield was needed for flying again.

Electrical Components in Houses

On July 18th, Mr. Hare asked the Minister of Health whether he was aware that many new electricity schemes in rural areas were now being held up by the failure of applicants in existing houses to obtain W.B.A. priority for the necessary wiring; and whether he was prepared to make some concession in this matter in order that villages should not be deprived of electricity when the electricity companies were prepared to make the necessary supply arrangements.

Mr. Bevan said that there was at present a shortage of certain electrical components, and W.B.A. priority for these could only be given to new housing since, without the components, new houses could not be ready for occupation. As soon as the supply position was sufficiently improved, W.B.A. priority would be extended to the wiring of existing houses.

Copper for Cables

Mr. Bossom asked the Assistant Postmaster-General what steps he was taking to overcome the difficulties his contractors were experiencing in obtaining copper and lead for cables.

Mr. Burke said that the amount of lead allocated to cable manufacturers was fixed by the rationing scheme covering all users of lead. There had been some arrears in the distribution of lead for the manufacturers of Post Office cables, and this was now being made good. The Postmaster-General had received no representations as regards copper but was looking into the position.

Radio Interference

A STATEMENT was recently issued by the British Standards Institution to the effect that there was a dearth of equipment complying with B.S. 727 for the measurement of radio interference, but that a certain type of radio receiver, R.206, could be adapted for this purpose: the G.P.O. was seeking to acquire these instruments and, owing to the limited number available, they would be allocated by the Post Office on the advice of the B.S.I., to which all inquiries should be addressed.

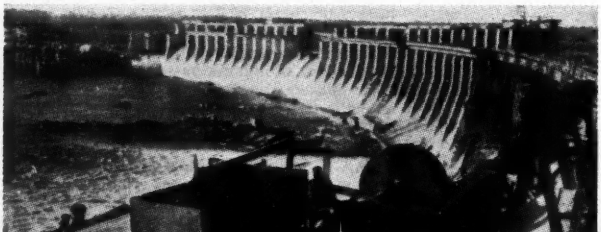
The cost of these receivers, modified to render them suitable for the measurement of radio interference, will be about £350 each. Some prospective purchasers may themselves be able to make the necessary modifications, the cost of the receivers in their unmodified form being about £250.

It is expected that delivery of the modified receivers can be made early in 1947 and the B.S.I. is now in a position to receive definite applications for them.

The Dnieper Dam

Rapid Restoration

IT is expected that by December next power will again be available from the Dnieper hydro-electric plant which was partially destroyed by the Russians during their retreat in 1941 and almost demolished by the Germans two years later. Since the Germans were cleared out work has been proceeding upon the reconstruction of the plant; 13,000 workers, including 5,000 women, have been engaged on it. It is hoped that restoration will be completed by 1948.



The Dnieper Dam in course of restoration (*Photo taken in April*)

The original plant comprised nine 85,000-H.P. sets; the turbines were made by the Newport News Co., of America, five of the 77,500-kVA, 13,800-V generators were supplied by the American General Electric Co. and four were produced at the "Electrosila" Works, Leningrad. In an article published in the *Electrical Review* of April 5th last, Ivan Bondarenko stated that six of the replacement turbines were being made at the "Stalin" Works, Leningrad, and the other three were to be imported from the United States.

Rather confusing reports appeared last week after a press visit to the Dnieper Dam. It is gathered from these that three of the generators are being provided by the Russians themselves, three by United States manufacturers and three by a British concern described in one report as the "British General Electric Corporation".

There is some dispute regarding the prices of the American quota. Capt. R. Williams, executive vice-president of the Newport News Shipbuilding and Dry Dock Co., is reported by *Reuter* to have admitted that the American turbine prices were more than double the 1930 prices but pointed out that the Russians were aware of this before the contract was placed. It has been stated in Moscow that if negotiations regarding prices break down six, instead of three, of the generators will be made in Soviet factories.

"Britain Can Make It" Exhibition

A REPORT on the progress of plans for the "Britain Can Make It" Exhibition opening at the Victoria and Albert Museum, London, on September 24th was given by Sir Cecil Weir at a press conference on Monday last. Sir Cecil estimated that more than 20,000 exhibits would be submitted by the 50 industries taking part in the exhibition, covering the whole range of consumer goods. He also acknowledged the assistance given by the various trade associations which had set up industrial advisory committees to assist the Council of Industrial Design. The selection committee headed by Lord Woolton would make its selection entirely upon the merits of the design of articles and manufacturers would have no voice in the selection, although the various industries had appointed technical assessors to advise the Council upon technical points. A team of 70 exhibition designers had been engaged who would be responsible for the *decor* of the various sections of the exhibition.

A substantial number of overseas visitors was anticipated and during the run of the exhibition it was hoped to arrange visits from art and secondary schools, works personnel, etc. Home and overseas buyers would be able to obtain particulars of any goods which interested them from information kiosks, which would also give facilities for establishing contact with manufacturers. Publications would include a small exhibition guide and a full catalogue containing the names of manufacturers and designers which would indicate whether commodities were intended for the British market or export.

During the first week of the exhibition a two-day conference on design under the joint sponsorship of the Council of Industrial Design and the Federation of British Industries would be held in the Central Hall, London, and would be the first of a series of conferences to be held in association with the exhibition. Papers to be delivered and discussed would deal with the designer's place in industry, the design of machinery, design and research, and design as an ally in export.

Domestic Water Heating

Further Views on the Top-Entry *v.* Side-Entry Question

By "Manufacturer"

RELATIVE merits of the top-entry circulator and the side-entry immersion heater were discussed by "Supply Engineer" in the *Electrical Review* of June 7th. It may interest readers to review this question through the eyes of an old-established manufacturer who has produced somewhere in the region of half a million of both types.

An immersion heater fitted horizontally in a tank or cylinder will heat uniformly all the water in the cylinder above the horizontal plane of the heater, all water below that being virtually unheated. This means that if a horizontal heater is not fitted as near the base of the tank or cylinder as possible, it will be impossible to heat the whole contents, and that portion of the cylinder below the level of the immersion heater would serve no purpose. Furthermore, owing to the uniform heating with this design, the whole of the contents of the cylinder must be heated before any hot water may be withdrawn.

Heating-up Time

For example, at 80 per cent efficiency, it would take approximately 2½ hr for a 3-kW heater to heat the contents of a 30-gal cylinder to 110 deg F (which is a minimum temperature for washing) and this period must elapse before even a small quantity of water at this temperature may be withdrawn. The only compromise is to move the horizontal heater nearer to the top of the cylinder, thereby reducing the heating-up time but rendering useless that portion of the cylinder below the heater. An excellent example of this is the horizontal electric immersion heater as fitted to cylinders in temporary houses (*Electrical Review*, March 15th), which requires 45 min before any water can be withdrawn at 110 deg F, but will not produce a satisfactory bath however long it is left on unless the setting of the thermostat is increased.

It may be said that these thermostatically controlled immersion heaters are designed to be left permanently in circuit and that under these conditions the above argument will apply only during the re-heating of the cylinder after the whole of the contents has been withdrawn. A census taken some time ago in a number of supply areas (including the North of England) established that slightly less than 2 per cent of the consumers were prepared to leave their immersion heaters permanently switched on. The theory that if the heater is switched on it is costing money is extremely deep-set.

If we accept that 98 per cent, or in fact any appreciable percentage, of consumers are going to hand-control their immersion heaters (using the thermostat virtually as a safety device), then the advantages of a vertical immersion heater or circulator become considerable.

A vertical circulator fitted to a cylinder heats the water in the cylinder from the top downwards so that directly a small quantity of water is heated it can be withdrawn and used. To quote our example, a 3-kW heater in 20 min at 80 per cent efficiency will produce 4 gal of water at 110 deg F (washing temperature). The longer the heater is left in circuit the greater the bulk of water heated until eventually the whole of the contents is heated and the thermostat cuts out. Where the immersion heater is not left permanently in circuit, therefore, it is difficult to follow the argument of those who insist that all immersion heaters should be fitted horizontally.

Temperature Gradient

"Supply Engineer" points out that with vertical circulators a very undesirable temperature gradient is set up between the water at the top and at the lower levels. This gradient may be undesirable in so far as the losses will be increased very slightly due to the increased temperature (although even here it may be borne in mind that compared with a horizontal heater the losses further down the cylinder will be less). Surely, however, this ability to provide small quantities of hot water quickly is not merely an advantage but an essential from the consumers' point of view?

Four golden rules to be observed when fitting a vertical circulator are:—The circulator must extend to the bottom of the cylinder (the large majority of complaints of insufficient bulk heating of circulators arise from the neglect of this point); secondary circuits, such as radiators and

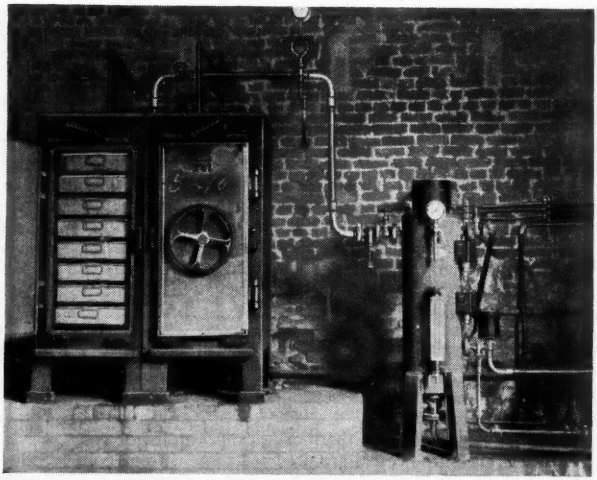
towel rails, must not be fed from the circulator; a 3-kW loading should be used, if permissible, to obtain maximum advantage from quick heating; efficient lagging is essential if the heater is permanently switched on and very desirable even if hand-controlled.

It has been suggested that the thermostat should not be fitted above a horizontal immersion heater, as its accuracy would be impaired by the rising stream of convected hot water. If a series of thermometer readings are taken at various points above a horizontal heater, it is extremely difficult to obtain a variation of more than a few degrees, but even assuming an increase of 5 deg due to the convection currents from the heater, rotation of the thermostat knob through 5 deg corrects the error which, being a constant, can be allowed for. Surely this is preferable to the alternative suggestion of a separate boss for the thermostat and two piercings of the cylinder wall instead of one. The same remarks apply to the vertical circulator. The thermostat knob can be adjusted so that the instrument will cut out for any desired water temperature at the top of the cylinder. Although under these conditions a higher thermostat differential is preferable, this is a feature which would tend to increase the thermostat's reliability.

There appears to be a definite tendency among the country's water-heating advisers to consider immersion heater design solely from a point of view of resistance to scale formation. Obviously a vertical immersion heater fitted with a circulating tube would not be the ideal design for a very hard water area; conversely, it is not reasonable to expect consumers in soft-water areas to be supplied with immersion heaters which, although excellent in their resistance to scale, lack other design advantages.

Cooking Beetroots

WHAT we believe is a new application for an electrode boiler is to be seen at Place Farm, Bold, near St. Helens, where Mr. J. Rothwell has recently had an electrode boiler installed for cooking beetroots. Operating on a 400-V, 3-phase supply, the apparatus is a standard Bastian & Allen 40-kW unit and provides steam at a pressure of 60 lb per sq in. in about four minutes starting from cold. The steam is taken to a Newton Chambers & Co.'s double steaming oven which operates at a pressure of 5 lb per sq in. and accommodates in each half eight trays each holding 28 lb of beetroots.



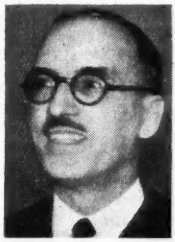
Electrode boiler beetroot cooking plant at Place Farm, Bold

Operation is completely foolproof. After setting the ram pump motor in action by means of a push-button starter, control is fully automatic, Satchwell pressure switches actuating contactor mechanism for regulating the operation of the pump and the load. Mr. Rothwell told us that it takes from ½ to 1¾ hours to cook the beetroots, according to their age: in addition 10 minutes is required for cooling. Normally only one half of the oven is in use at a time, one half being loaded while the other is cooking. The electricity supply, at a special off-peak tariff, is taken from the St. Helens Electricity Department, which was responsible for the arrangements and installation of the plant. Generally the cooker is used three days a week.

I.E.E. Officers for 1946-47

Mr. Vincent de Ferranti Elected President

THE election of Mr. V. Z. de Ferranti, M.C., as President of the Institution of Electrical Engineers for the 1946-47 session will prove a very popular choice in the electrical industry. Mr. Vincent Z. de Ferranti follows in the footsteps of his father, the late Dr. S. Z. de Ferranti, who was president of the Institution in 1910-11, and as chairman and managing director of Ferranti, Ltd., his wide experience of the electrical industry will prove invaluable in guiding the affairs of the Institution during the forthcoming session.



Mr. V. Z. de Ferranti

Born at Chelsea in 1893, Mr. de Ferranti was educated at Repton and served his apprenticeship with Yarrow & Co. The whole of his working career has been with Ferranti's, of whose Transformer Department he became manager in 1921. Upon the death of his father in 1930 he succeeded him as chairman of the company, and four years later he also became managing director. Mr. de Ferranti has taken an active part in the work of B.E.A.M.A., of which he was chairman in 1938, and in June this year he was elected an additional vice-president of the Association.

The vice-presidents for next session are Mr. J. Hacking, chief engineer of the Central Electricity Board, Mr. T. G. N. Haldane, M.A., consulting engineer, Merz & McLellan, and Prof. E. B. Moullin, M.A., Sc.D., Professor of Electrical Engineering at Cambridge University. The hon. treasurer is Mr. E. Leete, a director of the London Electric Wire Co. & Smiths, Ltd.

Three new vice-presidents: top, Mr. J. Hacking; bottom left, Mr. T. G. N. Haldane; right, Professor E. B. Moullin

The vacancies on the Council have been filled by the following: Members: Dr. T. E. Allibone, D.Sc., Ph.D. (Associated Electrical Industries), Mr. D. B. Hoseason (Brush Electrical Engineering Co., Ltd.), Col. B. H. Leeson, R.E., O.B.E., T.D. (A. Reyrolle & Co.), and Mr. H. Nimmo (Electricity Commission); Associate Members: Mr. C. S. Briggs, B.Sc.(Eng.), and Mr. F. C. Williams, O.B.E., D.Sc., D.Phil.; and Companion: Mr. G. Wansbrough.

The following have been elected as officers and as members of the Committees of the various Sections:—

Installations:—Chairman, Mr. J. F. Shipley; vice-chairmen, Messrs. R. O. Ackerley and R. H. Rawll; members of Committee, Messrs. L. S. Atkinson, A. N. Irens, R. T. Lythall, and C. T. Melling, M.Sc., Tech.

Measurements:—Chairman, Mr. L. J. Mathews; vice-chairmen, Mr. D. C. Gall and Prof. L. G. A. Sims, D.Sc., Ph.D.; members of Committee, Lt. Col. W. L. Beck, T.D., and Mr. L. Essen, Ph.D., B.Sc.

Radio Section:—Chairman, Prof. Willis Jackson, D.Sc., D.Phil.; vice-chairman, Mr. R. T. B. Wynn, M.A.; members of Committee, Messrs. R. F. T. Jarvis, Ph.D., B.Sc., B. N. Maclarty, O.B.E., E. C. S. Megaw, M.B.E., D.Sc., R. L. Smith-Rose, D.Sc., Ph.D., and G. M. Wright, B.Eng.

Transmission Section: — Chairman, Mr. J. A. Lee; vice-chairmen, Prof. W. J. John, B.Sc. (Eng.), and Mr. J. W. Leach; members of Committee, Messrs. R. Davis, M.Sc., H. Leyburn, B.Sc. (Eng.), and J. A. Sumner.

The full constitution of the Installations, Measurements, Radio and Transmission Sections for the next session is given in "Institution Notes in Part 1 of the Institution *Journal* for this month (No. 67).

The new officers and committees take office at the end of September when the Institute opens its next session.

C†

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

E.C.A. and the Register

I WOULD like to be allowed to correct the following statements that appear in the leading article in your issue of July 19th.

It is stated that:—"Such publicity as it has obtained has been financed mainly from the fees of members of the E.C.A. Rather belatedly the Register has recently decided to seek financial aid of the electricity supply industry. . . ."

So far as the writer's knowledge goes, after the first year of the Register the number of E.C.A. members who were also registered never reached more than 50 per cent of the total number of registered contractors; consequently it is hardly correct to suggest that E.C.A. members have mainly financed the Register's publicity. The statement that the Register has decided to seek financial aid from the electricity supply industry is not in accordance with facts.

I have also read the article "Registration of Contractors" on page 100 of the same issue of your journal. It is stated that under 500 of the 1,366 registered contractors are not members of the E.C.A. or the E.C.A. of Scotland and that the E.C.A. has a membership of well over 2,000. Assuming that these figures are correct, and allowing for members of the E.C.A. of Scotland who are registered, the figures prove conclusively the claim made by the Register that it has not received that measure of support from the members of the E.C.A. that it should have had and expected.

*London, S.W.*1. A. MONTGOMERY,
Secretary,
National Register of Electrical Installation Contractors.

Training Colliery Electricians

THE proposal for the training of future colliery electricians put forward by Mr. Maynard in your issue of July 19th is a sound scheme, but drastic changes in the industry must take place to raise colliery electricians' status.

For example:—Electrician £1 2s. 2d. per day, no certificate. "Deputy" £1 10s. per day, staff post, certified by simple oral examination. If an electrician is at some future date to be certified by technical examination will the status and remuneration be raised? One has no objection to carrying a bag of tools, "Megger," and hand lamp around (without a mate), but why is it necessary for skilled electricians to hang up armoured cable, or load trailing cables into tubs? The answer is given by one of our higher mining officials—"Electrician? That's a labourer's job." This sort of thing leads to the wastage of skilled men.

Colliery electricians would welcome:—1. A regulation to fix a suitable minimum number of skilled men, in relation to electrical H.P. and output per mine. 2. Certification, with staff appointment. 3. Better co-operation by the mining side of the industry.

These points are common "shop talk" at some collieries in this area. To the Association I say "Go ahead with the good work."

Derbyshire. COLLIERY ELECTRICIAN
(First-Class Certificate).

Porcelain Insulators

WITH reference to Mr. G. L. Mason's article in your issue of July 19th on testing insulators for deterioration, it is quite possible for a cracked or punctured cap-and-pin unit to withstand in dry weather its normal operating voltage of 5 to 15 kV. This is due to the length of the crack which is of the order of 2 cm and usually is quite clean and free from any organic matter. The flash-over voltage of a 2 cm surface may be 30 kV when dry and it is only the presence of moisture which will lower it sufficiently to be detected in service.

In the same issue Mr. A. Robertson referred to the distribution of tension across insulators on d.c. transmission as being more uniform than on a.c. This is only true when all insulators are clean and of the same insulation resistance. After a short time in service the surface of the insulators becomes polluted and of most irregular conductivity. This feature is probably one of the most serious problems in high-voltage d.c. transmission especially in the design of cable sealing ends where the field strength is very high at the surface of the earth end of the termination.

Hanley. J. H. PIRIE, D.SC., A.M.I.E.E.

Overseas Electrical Trade

Lower Values for June

EXPORTS of electrical goods and apparatus and machinery during June shared in the general fall, attributable partly to there being four fewer working days than in May. The total of £3,542,655 compares with an abnormal figure of £5,415,006 for May but it was still substantially higher than the total for the corresponding month of last year—£2,625,294, and the monthly average of £1,814,112 for 1938.

Some of the decline as compared with the May exports was due to the reduction in shipments of cables of all classes from £1,141,037 to £684,050. The June, 1945, total was £422,708. Argentina was the principal customer for non-submarine telegraph and telephone wires and cables (£19,368) and New Zealand (£24,512) for rubber-insulated cables. In the largest class, cables with insulation other than rubber, British India accounted for £45,847, South Africa for £40,394, Australia for £29,674, and Argentina for £18,686.

A fall in exports of telegraph and telephone apparatus from £400,630 to £312,212 was counterbalanced by an increase in radio equipment shipments from £687,626 to £749,536. Cooking and heating apparatus showed a decline from £125,029 to £77,703, and insulating materials fell from £130,603 to £81,715.

From Table II it will be seen that the principal buyer of electrical goods and apparatus in June was British India (£274,911) with South Africa a fairly close second with £236,800. Other important markets were France (£190,426), the Netherlands (£140,473), Portugal (£123,994), Palestine (£121,712), New Zealand (£105,629), and Australia (£103,394).

Electrical machinery exports were less than half the May figure, the total being £785,127 against £1,702,401. Generators and parts fell

TABLE I.—ELECTRICAL EXPORTS AND IMPORTS

Class	Exports			Imports		
	June, 1946	June, 1945	Monthly Av., 1938	June, 1946	June, 1945	Monthly Av., 1938
	£	£	£	£	£	£
Telegraph and telephone wires and cables, submarine	29,104	18,574	17,289	2,163	116,084	31,246
Ditto, not submarine	125,815	54,040	71,803			
Wires and cables, other than telephone and telegraph, rubber insulated	198,123	180,595	117,533			
Ditto, insulation other than rubber	331,008	169,499	153,256			
Radio apparatus	749,536	325,368	149,593	402,384	1,272,204	75,160
Telegraph and telephone apparatus, other than radio	312,212	238,952	242,716	1,240	22,936	9,243
Electric carbons, furnace	*	*	*	—	121	4,054
Other electric carbons	*	*	*	4,207	11,823	2,301
Electric lamps	81,660	89,934	49,440	1,119	9,296	10,265
Other lighting apparatus	134,089	42,445	48,565	2,644	25,401	38,662
Primary batteries	31,972	12,533	13,572	2,094	41,457	3,549
Accumulators, portable	91,290	50,119	28,874	*	*	*
Ditto, stationary	20,868	2,078	19,773	*	*	*
Ditto, parts and accessories	38,546	11,264	*	*	*	*
Electric cooking and heating apparatus	77,703	22,925	30,664	*	*	*
Commercial electrical instruments, including ammeters, voltmeters, etc., and parts	52,621	26,331	15,878	5,927	27,815	32,057
House service meters	28,596	10,003	15,791			
Other electrical instruments	41,648	23,344	9,612			
X-ray apparatus, vacuum tubes and parts	16,382	26,129	4,881	9,188	53,130	9,734
Insulating materials, not elsewhere specified	81,715	33,796	19,343	*	*	*
Unclassified electrical goods and apparatus	211,698	140,924	110.615	21,116	399,643	42,630
Generators, complete, up to 200 kW	32,704	50,291	38,071	*	*	*
Ditto, over 200 kW	71,108	32,364	119,079	*	*	*
Ditto, parts	70,847	*	*	*	*	*
Motors	187,770	159,891	145,045	574	13,162	26,033
Convertors and transformers	134,698	110,665	101,304	*	*	
Rectifiers for power-house use	8,691	6,559	3,463	*	*	
Motor starting and controlling gear	60,668	46,394	50,866	*	*	
Switchgear and switchboards, other than telegraph or telephone	210,132	160,082	184,533	*	*	
Other electrical machinery	8,509	574,316	15,497	1,026	329,864	14,455
Electric vacuum cleaners	70,660	309	26,662	123	—	7,519
Other electrically-operated portable appliances	32,282	5,570	10,394	1,338	2,458	17,108
Total	3,542,655	2,625,294	1,814,112	455,143	2,325,394	324,016

* Not classified separately

from £788,716 to £174,659. Canada (£47,557) was the principal customer for this class and Russia is credited with £27,450. Exports of motors decreased from £266,780 to £187,770. Of this total British India took £38,077 and South Africa £30,643. The value of exports of transformers, convertors, switch and control gear, etc., was £422,698 as compared with £646,905. British India was by far the most important customer for this class with a share of £110,413; next came South Africa (£57,237), New Zealand (£38,718) and Australia (£21,260). It is noteworthy that the Soviet Union imported this class of equipment to the extent of £10,395, as compared with £610,315 in June last year.

Electrical imports during June reached a total of £455,143 (against £177,120 in May), thus reversing the recent tendency. The total was still very much below the June, 1945, figure—£2,325,394. The increase as compared with May was due mainly to greater imports of radio equipment (£402,384 against £106,383).

TABLE II.—DISTRIBUTION OF EXPORTS OF ELECTRICAL GOODS AND APPARATUS

Destination	June, 1946	June, 1945	Monthly Av., 1938
	£	£	£
Eire	83,852	51,045	37,562
Channel Islands	40,368	—	11,965
Palestine	121,712	2,402	8,371
British West Africa	51,653	6,767	12,864
Union of South Africa	236,800	186,262	157,602
Southern Rhodesia	29,354	13,298	9,574
British East Africa	22,578	25,313	7,830
British India	274,911	192,922	122,928
British Malaya	72,122	—	32,280
Ceylon	14,701	10,606	14,931
Hong Kong	41,187	—	12,874
Australia	103,394	379,884	196,823
New Zealand	105,629	141,090	95,851
Canada	23,883	23,745	12,482
British West Indies	32,256	34,193	12,887
Other British Countries	36,845	27,493	26,336
Soviet Union	5,928	111,212	36,780
Finland	14,346	—	5,824
Sweden	117,712	986	13,735
Norway	89,125	1,624	12,582
Denmark	54,144	—	18,282
Poland	5,308	—	9,626
Netherlands	140,473	1,385	20,190
Belgium	62,752	651	10,874
France	190,426	799	15,674
French West and Equatorial Africa	567	1,439	400
Switzerland	9,918	—	3,572
Portugal	123,994	23,200	6,498
Portuguese East Africa	2,623	1,435	6,924
Spain	12,596	25,988	3,808
Italy	2,078	454	5,659
Czechoslovakia	10,627	—	7,205
Yugoslavia	1,227	9,381	1,471
Greece	25,934	—	4,888
Roumania	—	—	13,350
Turkey	18,108	25,736	7,633
Egypt	137,099	13,719	12,872
Iraq	15,749	19,933	5,456
Iran	15,932	27,511	16,330
China	7,591	25,946	4,042
United States	5,402	61,733	5,546
Chile	2,909	36	6,635
Brazil	21,886	4,205	11,123
Argentina	59,803	8,852	45,387
Other Foreign Countries	209,084	17,608	33,672
Total	2,654,586	1,478,853	1,119,198

Electricity Prices

Companies' Reply to Mr. Shinwell

IN a statement issued this week, the electricity supply companies say that they view with the utmost concern the statement which Mr. Emanuel Shinwell, Minister of Fuel and Power, is reported to have made to the Parliamentary Socialist Party that it might be necessary to increase the price of gas and electricity to discourage consumption. They wish to dissociate themselves from this policy, the only effect of which will be to inflict further hardships on the public.

In the companies' view the Minister's statement can only mean that the coal position, especially as regards supplies to electricity and gas works both now and as regards the coming winter, is far more serious than the Minister has chosen to admit.

The opinion is expressed that it is a serious matter for consumers, especially housewives, to be told that prices of electricity and gas—acknowledged as the most economical fuels for cooking, heating and lighting—must be raised in order to restrict their use. Manipulation of the prices of gas and electricity is no substitute for failure to produce coal. The Minister should tell the public the facts about the coal position as they are known to every major industry in the country.

Slotmeter Collections

Crown Lose Revenue Appeal

IN the King's Bench Division of the High Court on Monday, Mr. Justice Macnaghten gave judgment on information by the Crown claiming that the Northwood (Middlesex) Electric Light & Power Co., Ltd., was liable to a fine of £10 under the Stamp Act, 1891, for failing to give a receipt bearing a 2d. stamp for a sum exceeding £2 collected from a prepayment electric light meter.

For the Crown it was stated that the amount collected from the meter was £3 1s. The tenant received 10s. 1d. back but no 2d. stamp was placed on the receipt for the balance. For the company it was submitted that as the tenant paid each time for the amount he consumed by the money which he put in the box there was no liability on the part of the company to provide a 2d. stamp when the total collected exceeded £2.

His Lordship held that in the circumstances the company was not liable to put a 2d. stamp on the receipt. The tenant in the house was given a card from time to time; that card was checked and when the tenant left, the card was passed on to the tenant who followed. The tenant paid for the current he received from time to time and the company was not liable to put a 2d. stamp on the total amount paid. In the circumstances of the case he gave judgment for the company with costs.

PERSONAL and SOCIAL

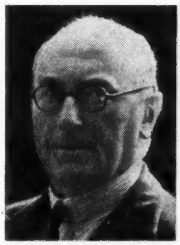
News of Men and Women of the Industry

IN giving last week a congratulatory luncheon party for **Mr. D. A. Bremner,** O.B.E., M.I.Mech.E., M.I.E.E., the Council of the British Engineers' Association paid tribute to its former director whose eightieth birthday occurs this month, and whose whole working life has been devoted to the engineering industry. Among the guests were Sir William Larke, K.B.E., Sir Guy Locock, C.M.G., Mr. V. Watlington and Mr. Loughnan Pendred. Former members of the B.E.A. Council and presidents who were able to be present included Sir William Reavell, Mr. J. J. Carter, Mr. Harry Allcock and Mr. W. D. Lancaster. Mr. Bremner, in responding to the welcome of Lt. Col. H. Riggall, J.P., president of the B.E.A., recalled that so far back as 1882 he was working in an "electric lighting station," and that before 1890 he had set to work the northernmost generating plant in Finland, other plants in tropical Egypt and at the Earl's Court Exhibition.

Professor J. T. Randall, Professor of Natural Philosophy in the University College of St. Andrews University, has been appointed to the Wheatstone Chair of Experimental Physics in London University, in succession to **Sir Charles Ellis** who has been appointed a member of the Coal Board. Professor Randall was educated at Manchester University under Professor Sir Lawrence Bragg, and for some years was on the staff of the research laboratories of the General Electric Co., Ltd., at Wembley. In 1937 he became Warren Research Fellow of the Royal Society, and worked in Birmingham University on problems of luminescence and on ultra high frequency modulators. In 1940, in association with Mr. H. A. H. Boot, he discovered the cavity magnetron. From 1943-44, Professor Randall was a lecturer at the Cavendish Laboratory, Cambridge, after which he succeeded to the chair at St. Andrews. He was awarded the Grey Memorial Prize of the Royal Society of Arts in 1944, the Duddell Medal of the Physical Society in 1945, and was elected a fellow of the Royal Society this year.

A large number of employees, together with their families and friends, attended the annual sports and gala held by the sports and social organization of Elexcel, Ltd., of Liverpool, on July 13th on a ground lent for the occasion by the Liverpool Electricity Supply Sports and Social Club. In previous years this event has been held in conjunction with that of the associated company, Automatic Telephone & Electric Co., Ltd.,; this was Elexcel's first independent sports day. An extensive programme of events provided much entertainment and opportunities for competitors, the wives and children of employees being well catered for. The many prizes included an inter-departmental trophy given by Mr. J. C. Wrighton, M.I.E.E., managing director, and two inter-company challenge shields which were competed for by ladies' and men's teams from Elexcel, Automatic Telephone & Electric Company and British Insulated Callender's Cables. Prizes and trophies were presented by Mrs. J. C. Wrighton.

Mr. G. H. Lake, who has been city electrical engineer of Nottingham for sixteen years, is retiring at the end of August, and the Electricity Committee has decided to advertise for a successor. Mr. Lake was born at Stoke-on-Trent and was educated at the Audley Grammar School, the Newcastle-under-Lyme Middle School and Derby Technical College. After an apprenticeship with the Epstein Electric Accumulator Co., he joined the Derby Corporation Electricity Department in 1900 as an engineering assistant and twenty-six years later was appointed borough electrical engineer. He went to Nottingham as "chief" in 1930. Lately he has been supervising the important extensions of the North Wilford station. Mr. Lake is a member of the Institution of Electrical Engineers and a fellow of the Institute of Fuel and has served on the Councils of the I.M.E.A. and E.D.A.



Mr. G. H. Lake

Dr. D. F. Twiss, one of the world's leading authorities on rubber, has just retired after acting as chief chemist of the Dunlop organization for thirty-two years.

Before his departure for India by air, **Mr. Sham Sundra,** managing director of Electronics, Ltd., New Delhi, gave a dinner on July 11th, to which he invited a number of friends in the radio and electrical industries. Edstone, Ltd., 41, Spenser Street, London, S.W.1, will deal with inquiries on Mr. Sundra's behalf after his departure from this country.

After a break of six years the staff of Ferranti, Ltd., resumed their annual competition for the Ferranti transatlantic golf trophy presented by Mr. V. Z. de Ferranti, the chairman of the company. The competition is played simultaneously in England, Scotland and Canada. After receipt of all the cards from the various competition points, and after the necessary adjustments had been made in respect of handicaps in relation to the courses, Mr. Gadway of the Canadian factory was declared

to be the winner with a score of 67 and he will hold the trophy for one year with a replica for permanent retention. The best score returned at Blackley, Manchester, was 69 by Mr. A. J. Gray and Mr. Chapman of the Hollinwood factory. The best score from Edinburgh was 75.

Mr. T. H. Carr, electrical engineer and manager, Bradford, has recently been elected to the committee of the Yorkshire Association of the Institution of Civil Engineers.

Mr. W. Morrison Little, B.Sc., A.M.Inst.C.E., who was formerly on the staff of the Edinburgh Transport Department, has been recommended by Edinburgh Corporation Public Utilities Committee for the post of deputy transport manager for the city.

Mr. L. Moir has resigned from the position of senior representative and acting London manager with the Revo Electric Co., Ltd., and has joined Parnall (Yate), Ltd., with whom he will be responsible for the development and sales of cookers and other domestic electrical appliances. He will be at the company's head office, The Aerodrome, Yate, near Bristol.

Mr. H. R. Harding, sales director of Associated Electrical Industries (India), Ltd., is at present in this country on leave from Calcutta and his address is Crown House, Aldwych, W.C.2.

Mr. H. H. George, managing director of Associated Electrical Industries Manufacturing Co., Ltd., is also in this country on leave from Calcutta and his address is Crown House, Aldwych, W.C.2.

Islington Borough Council Electricity Committee has appointed **Mr. F. H. Smethurst,** of Gravesend, as shift charge engineer at a salary of £490 per annum.

Mr. F. Clegg, A.M.I.E.E., second mains assistant with Rochdale Corporation Electricity Department, has been recommended for the appointment of mains assistant in the Hammersmith Electricity Department at a salary of £565, rising to £583 per annum.

Mr. L. C. Sharp, sales director of Venner Time Switches, Ltd., has now returned to this country after a six weeks' visit to Australia. He made the outward journey in three days by air, and also flew back calling at the Dutch East Indies, Malaya, Burma, India, Iraq, Egypt and Sicily.

Mr. H. J. E. Anscombe, B.Sc., of Brighton, has been appointed senior lecturer in electrical engineering at Wigan Mining and Technical College. He will commence his duties on September 1st.

At the 19th annual championships of the Women's A.A.A. on July 13th at the White City Stadium the Ekco Sports and Social Club was well to the fore. Against women athletes from all parts of the British Isles, Miss D. Endruweit took second place in the discus, javelin and high jump contests. With a 5 ft jump, one inch behind the winner, she was unlucky in catching the bar in her last attempt. Miss D. Humphreys of Ekco was presented with the standard medal awarded by the Association for her time in the 200 metres race.

Southend Town Council at its last meeting placed on record its high appreciation of the services rendered by **Mr. A. C. Johnson,** M.I.E.E., M.I.Mech.E., who is shortly retiring from the position of borough electrical engineer and manager. Mr. Johnson was born in France in 1878 and was educated there and in Germany and England. In 1900 he was appointed assistant to the Chelsea Electric Supply Co., and in 1903 became chief assistant to Burnley Corporation Electricity Department. He joined the Southend undertaking in 1905 as deputy borough electrical engineer and became chief engineer in 1929. Under his guidance the undertaking has developed rapidly, the annual sales rising from 16½ million to 72½ million kWh. On his advice the system was changed from D.C. to A.C., resulting in a considerable financial saving. He was responsible for carrying out the illuminations which before the war attracted many visitors to the town.

Mr. D. M. Thornton, B.Sc., A.M.I.E.E., has been appointed deputy county electrical engineer of Kirkcudbrightshire. He is at present on the staff of Dumfriesshire Electricity Department, where he has been for the past fifteen years. After graduating at Edinburgh University he took up an appointment with the National Electric Construction Co., London, and later joined the staff of the Lothians Electric Power Co. in Edinburgh. He was secretary of the Dumfries Electrical Society until it suspended activities at the outbreak of war.

Mr. H. M. Kelk has been appointed managing director of Overend & Co., Ltd., in succession to **Mr. F. Firth** who has retired. Mr. Kelk was previously with the Sterling Cable Co., Ltd.

Sir Edward Wilshaw, chairman of Cable & Wireless, Ltd., has been appointed chairman of the Globe Telegraph & Trust Co., Ltd., and **Mr. B. W. Bloomer** has joined the board. **Mr. F. A. Johnston,** the retiring chairman, is retaining his seat on the board.

Mr. R. T. Parry, A.M.I.E.E., Assoc.I.Mech.E., has been elected president of the Engineer Surveyors' Association for 1946-47.

Mr. C. W. Kellogg is retiring from the position of president of the Edison Electric Institute. After serving in various branches of the American electrical industry, Mr. Kellogg, who is sixty-six years of age, became part-time president of the Institute in 1936 and three years later was appointed as the first salaried full-time president. The Institute is reverting to its previous policy of having a non-salaried president elected annually from member company executives and **Mr. Grover C. Neff,** president of the Wisconsin Power & Light Co., has been elected president for the ensuing year.

Appointments Vacant.—Among the vacancies advertised in this issue are the following:—Head of Electrical Engineering Department, Northampton Polytechnic; deputy borough electrical engineer, Leyton; installation engineer, High Wycombe; distribution engineer, etc., for Shoreditch; general manager for Indian telephone factory; professor of mathematical physics, associate professors and lecturers for the Military College of Science, Shrivenham.

Obituary

Mr. E. H. Freeman.—It is with regret that we report the death of Mr. E. H. Freeman, M.I.E.E., A.C.G.I., of Tyler & Freeman, which occurred on July 11th at the age of sixty-seven. Mr. Freeman was educated at the Haberdashers' School and took a course in electrical engineering at the Central Technical Institute. In 1898 he was appointed assistant engineer to Siemens Bros. & Co., Ltd., Woolwich, and in the following year became cable engineer with the Telegraph Construction & Maintenance Co., Ltd. Two years later he went to Johannesburg, where he joined William Hosken & Co., as general manager of their electrical department. Mr. Freeman returned to this country in 1905 and joined Mr. R. G. Tyler, M.I.E.E., and as Tyler & Freeman they have been well known as electrical contractors.

Mr. R. Hodgson.—The death has occurred at Ryton-on-Tyne of Mr. Ralph Hodgson, general manager of Hodgson & Coley, electrical engineers, Ryton. Mr. Hodgson was fifty-seven years of age.

Mr. A. J. Ostler, whose death is reported at the age of sixty-eight, retired from Bristol Corporation Electricity Department less than eighteen months ago. He was a past-president of the Electrical Power Engineers' Association.

The Hertfordshire Show

ONCE again the joint stand of the Northmet Power Co. and the Watford Electricity Department won the first prize for the best trade exhibit last week at Cassiobury Park, Watford, on the occasion of the first Hertfordshire Show held by the newly-amalgamated Hertfordshire Agricultural Society, which has taken the place of the Watford and District Agricultural Society, the Tring Agricultural Society and the former Hertfordshire Agricultural Society. All aspects of the use of electricity on the farm and in the home were covered by the display, which was the largest in the Show.

The Northmet and Watford Department's prize-winning display at the Hertfordshire Show

Separate sections were devoted to horticulture, barn machinery, poultry, pumping, the dairy, general equipment and domestic appliances, and demonstrations were given of a model grain drying plant, grain moisture meter, an "Essex" mill, egg grading and testing apparatus, dairy equipment, pumping plant and domestic appliances. There was considerable interest in the horticultural exhibits which included portable spraying plant, nursery circulating pumps, soil warming equipment, forced draught equipment for nurseries, a soil sterilizer, a greenhouse heater with humidity control, a low-voltage strip greenhouse heater, a conversion heater for a coke-fired hot-water system, a greenhouse thermostat, and a hedge trimmer.

Among the dairy equipment were examples of a milk cooler, cold room, milking machine, sterilizers, churn stool, bottle washer, electric milk pram, and storage water heaters, while general equipment included bench and flexible shaft grinders, portable and heavy duty drills, welding plant, battery charger and vulcanizer.

Many of the new post-war models were to be seen among the display of cookers, water heaters, wash-boilers, washing machines, refrigerators, vacuum cleaners, kettles, clocks, irons, fires and other domestic appliances.

Institute of Fuel Charter

THE Institute of Fuel has been notified by the Lord President of the Council that His Majesty the King has approved the grant of a Charter to the Institute. Thanks are expressed by the Institute to Sir John Greenly, Mr. H. A. Humphrey, and other members of the original Charter Committee, as well as members of the present Committee, including Dr. G. E. Foxwell, as Charter secretary, who have been instrumental in securing the Charter.

NEW BOOKS

Building Design and Heating. Radio Mathematics Textbook.

Heating and Ventilating for Architects and Builders. By R. K. Cornell, A.M.I.H.V.E. Paul Elek Publishers, Ltd., 37-38, Hatton Garden, E.C.1. Price 7s. 6d.

The book starts well, particularly where it shows the importance of providing a really well heat-insulated structure. Nevertheless most electrical engineers concerned with electric heating systems will conclude that Mr. Cornell has done less than justice to the electrical industry.

One instinctively turned to the title pages to see if the book was a reprint of some earlier and unrevised effort of, say, 1926. For instance, according to the author, the main groups of electric fires are:—(a) "Luminous types, which include a form of electric bulb . . . about ten inches long by two inches diameter." (b) The usual type of fire with exposed spiral resistance . . . either in straight bars with large diameter spirals or in small diameter spirals wound on flat refractory material. . . ." (c) "Radiators with polished metal backing. . . ."

Type (a), of course, has been off the market for more than thirty years with one minor exception, which in any case does not entitle the author to place it first on the list. Type (b) obviously refers to the conventional firebar type with element in close contact with the ceramic. The alternative, however, looks suspiciously like the unsatisfactory pre-1914 type of fire-bar. It is significant that the most advanced and up-to-date type of radiator is placed third and has the least said about it. Surely the omission of liquid filled steel radiators is an oversight.

On water heating by electricity only the sketchiest details of the immersion heater are given while all that can be said of the self-contained type is that "the usual finish to the exterior surface is white enamel and the electrical supply is thermostatically controlled." No mention, it will be seen, of lagging nor yet the immense advantages of electric water heating. In comparison solid fuel gets the lion's share of space; no doubt the author knows this side of the business well—perhaps too well.

Introducing the subject of electric heating by thermal storage the author hurries through half a page describing the principles but once again omits to mention that the storage is well lagged, a feature without which would make the system unworkable. Later he says that electricity is far and away more costly than any other method. The process of arriving at the latter conclusion is all too familiar—the usual efficiency claims based on snap tests:—70 per cent for solid fuel, 75 per cent for gas, and so on, with coal at 35s. per ton, gas at 4d. per therm and electricity at 4d. (night tariff), plus imaginary repairs to the electric boiler ten times as heavy in cost compared with gas. No mention either of savings in building costs possible with the omission of flues or approach roads for fuel delivery.

One can imagine the architect reader asking himself in face of all this why the Royal Institute of British Architects has electric thermal storage heating in its London headquarters.—P.H.

Basic Mathematics for Radio Students. By F. M. Colebrook, B.Sc. Pp. 270; figs. 77. Iliffe & Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 10s. 6d.

The title explains the work adequately and as a textbook of mathematics there is nothing to criticize about it. It covers a wide range, practically all that is necessary for the radio engineer and is obviously written by someone who thoroughly understands his subject, in fact, by a mathematician. Starting at the very beginning of algebra the lay-out of the subject is interesting. Complex numbers and series come before trigonometrical ratios. It is interesting to see many of the ordinary geometrical propositions proved by trigonometry rather than by the tedious Euclidean reasoning, and the theorem of Pythagoras taken as a special case of $b^2 = a^2 + c^2 - 2ac \cos \theta$ where $\theta = 90°$.

Vectors are introduced early, arising out of geometry and the operator "j" to prepare the student for their use with alternating currents. The writer has obviously drunk deep from Hogben and Whitehead and this has influenced greatly his treatment of the subject which is racy, but perhaps in some places too metaphysical and profound for a radio engineer. Quite early (page 19) he defends this treatment stating that the student must, to a certain extent, understand the rules, though not completely. To test this understanding on a simple point he asks the question, "If we multiply volts by amps, why can't we multiply apples by oranges?" We were much interested in the statement (page 24) that "one cannot multiply a number by a negative number, but who would want to," and the footnote to this "This statement is calculated to raise clouds of dust from the pages of agitated and outraged text-books." Also on page 155 it is stated to be quite unintelligible that area is length multiplied by length.

Enough has been said to show what is perhaps both the fascination and the deficiencies of the work. We wonder whether it was necessary to enter into so much hypothetical analysis for, to use his own phrase, "a work as elementary as this." Still anything that encourages clear thinking is to be commended and this, in fact, is the keynote of the book. There are well-selected examples from electrical theory but we think an index would help.—W. C. A.

Ordering Power Cables

Data Required by Manufacturers

By C. C. Barnes,
Graduate I.E.E.

INQUIRIES and orders relating to power cables frequently give very limited data and this leads to loss of time and inconvenience. In order that a manufacturer may tender satisfactorily, thus obviating the necessity for alternative schemes because of the omission of essential information, the prospective customer should give comprehensive details of his requirements.

Modern power cables for transmission and distribution consist of conductors stranded from high-conductivity plain annealed copper wires insulated with oil-impregnated paper tapes; the single-, or multicore assembly is then enclosed in an impermeable sheath of lead or lead alloy.[1] The sheath is protected from corrosive elements by a double layer of heavily compounded paper tapes followed by a layer of jute roves or hessian tape. Mechanical protection is provided by a double layer of steel tape or a layer of steel wires, followed by an outer covering of compounded textile material. The current British Standards for paper insulated and other cables are set out in Table 1.

For service voltages up to and including 22 kV, multicore cables of the belted type have given splendid service, but above that voltage they have proved unsuitable and a modified design (first patented by M. Hochstadter in 1914) known as the "H" or screened-type cable solved the problem for higher operating voltages. In recent years increasing use has been made of oil-filled cables[2] and various designs of internal[3] and external[4] gas-pressure cables for 66 to 220 kV.

Varnished cambric has been used as an insulant for electric power cables for many years and interest in its possibilities developed appreciably following the loss to the Japanese forces of rubber plantations in Malaya, Burma and the Dutch East Indies, since when for many purpose V.C. insulated cables have replaced rubber-insulated cables.

The advantages of V.C. cables are as follows:—There is no fluid insulating compound to cause drainage or migration troubles. The maximum permissible conductor temperature is relatively high, 70 deg C for all cables up to 11 kV excluding 11-kV twin and multicore belted cables, for which it is 65 deg C; these temperature limits are the same as for paper-insulated cables and higher than those permitted for ordinary rubber-insulated cables. They can be supplied with a textile braid and waterproof compounded finish, whereas paper cables are always manufactured with a lead sheath except for mining work where paper-insulated bitumen-sheathed cables are sometimes used in order to minimize the weight to be handled.[5] In general lead-covered varnished cambric insulated cables are more expensive than the lead-covered paper-insulated type, but they

TABLE 1—BRITISH STANDARDS FOR POWER CABLES

B.S.	Title	Voltage Range
480–1942	Paper Insulated Cables for Electricity Supply.	660 V to 22 kV earthed type; additional tables are included for 3·3 to 11 kV unearthed type.
608–1943	Varnished Cambric Cables for Electricity Supply.	660 V to 11 kV, earthed type only.
760–1943	Paper Insulated Cables for Use in Mines.	660 V to 6·6 kV earthed and unearthed types.
883–1940	Cables and Flexible Cords for Electrical Equipment of Ships.	1 to 6·6 kV paper cables and V.C. cables; also range of rubber and PVC-insulated cables.
1216–1945	Jute Insulated Cables for Electricity Supply.	660 V only.
7–1939	Rubber Insulated Cables and Flexible Cords for Electric Power and Lighting. (Amendment No. 3 provides a supplement relating to Polyvinyl Chloride Compounds.)	250 V to 11 kV.

show a fair saving when compared with lead-covered rubber or P.V.C. insulated cables.

In the absence of a detailed cable specification the length of cable and length required per drum should be stated or, alternatively, the maximum gross weight of cable and drum which can be conveniently handled; for export the maximum overall dimensions of the cable drum which can be accommodated is sometimes required. The size and shape of conductor, e.g., 0·1 sq in. (= 19/083) should be given; 0·0225 sq in. conductors and larger copper sections for multicore cables are normally shaped in order to minimize cable weight and dimensions; B.S. 480-1942 recommends the same copper section for the neutral as for the phase cores in a four-core cable.

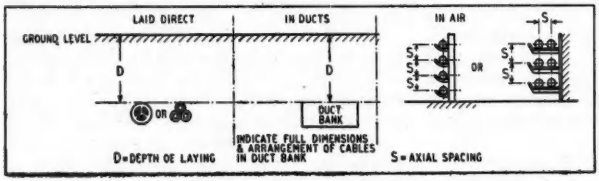


Fig. 1.—Data required for calculating cable ratings

When the system voltage exceeds 660, it should be stated whether the centre point of the system is earthed or unearthed. Other information required is the number of cores, the working pressure (phase-to-phase) and the type of armouring, e.g., double steel tape (S.T.A.), single- or double-wire armour (S.W.A. or D.W.A.).

Where a cable specification is required the following particulars are necessary and should be supplied:—

Type of supply system, e.g., 250 V d.c., two-wire, or 430 V, three-phase a.c., four-wire supply, or 6,600 V three-phase a.c. system, centre point earthed, etc.

Power load; amperes per phase or load in kVA or kW with power factor or H.P. with power factor and efficiency of the motor (if known). Maximum permissible voltage drop and whether this information refers to phase-to-phase or phase-to-neutral voltage.

Method of installation: Whether laid direct, in air, or pulled into ducts; number of circuits and method of grouping; depth of laying to top of cable or duct bank (D in Fig. 1), duct material, diameter of duct, spacing of ductways, soil thermal resistivity, initial temperature (soil or air), maximum permissible conductor temperature, temperature rise and any special route conditions.

When the load is intermittent and the most favourable current rating is required, give full particulars of the load cycle, e.g., average load 250 A. for eight hours, no load sixteen hours, six days per week. The heating effect of the load current increases the ohmic resistance of the conductor above the "standard" resistance at 60 deg F given in B.S. 480-1942 and Fig. 2 gives the correction factor for the final conductor temperature.

Standard methods of installing cables are by burying direct in the ground at the following depths to the cable axis (plus radius of complete cable): 660 V, 18 in.; 3·3 kV to 22 kV (inclusive), 36 in.; 33 kV and above, 42 in. These cables should be armoured

TABLE 2—MINIMUM SPACING OF CABLES OF AIR

Conductor area (sq. in.)	Minimum axial spacing (in.)	Max. number of cables permitted	
		Vertical plane	Horizontal plane
Up to 0·1 sq. in. (19/083)	3	3	No limit
0·12 sq. in. (37/064 and larger sections)	6	4	No limit

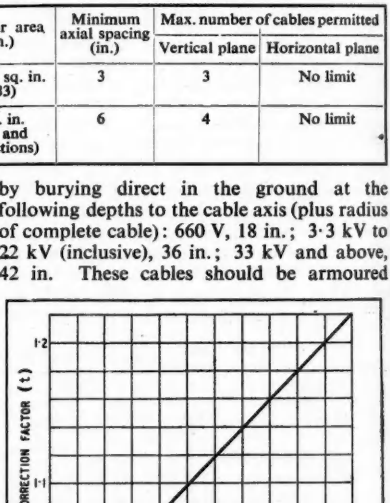


Fig. 2.—Temperature correction for copper conductor

with steel tape or wire, unless the customer is fully satisfied that there will be no risk of mechanical damage to the cable. In any case, however, buried cables should be covered by creosoted boarding or concrete slabs. Wire armouring should be used for river crossings, marshy ground, rising mains or colliery shafts, or where there is any likelihood of ground subsidence or pull on the armouring (i.e., in duct installations).

Plain lead-covered cables are sometimes laid underground in wooden troughs filled with bitumen; this method has been used where chemical or electrolytic corrosion (due to stray electric currents) is to be prevented but otherwise is seldom adopted. Cables suspended in air or hung on brackets alongside railways or in tunnels should always be wire-armoured.

Cables may also be drawn into ducts where the district is congested and excavation work is difficult. Multi-way ducts readily provide for future requirements if spare ways are provided. Additional cables can be drawn in or old cables removed without interference to the ground surface, but the reduction in current rating generally causes duct runs to be restricted to road crossings.

Ductways consist of earthenware, fibre or metal tubes and should not be confused with open trenches (chases) made in concrete floors which are also often referred to as cable ducts. This distinction is of importance, since the current rating for a cable in a duct is much lower than for other installation conditions, whereas cables run in open trenches are virtually in free air and on this account are permitted a higher rating.

The current carrying capacity of a cable[6] depends on three main factors: Maximum permissible temperature at which its components may be operated, allowing a reasonable factor of safety based on experience; its heat dissipating properties; method of installation and ambient conditions.

In general the same cable will carry currents in descending order of magnitude[7] if run in free air, laid direct on the ground, pulled into single-way ducts, pulled into multiway ducts or based on 1,000 A per sq in. of copper section. This generalization must be used with care, however, since as Fig. 3 shows, for copper sections below 0·35 sq. in., the current rating is greater when laid direct (curve a) but for larger copper sections the reverse is the case (curve b), the size at which transition occurs varying with the type of cable and service voltage.

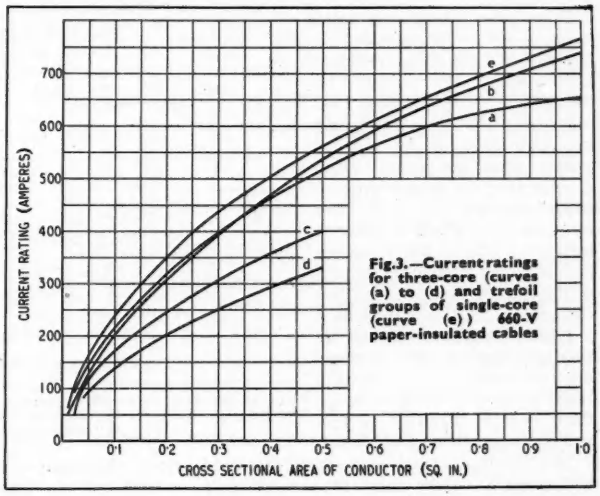


Fig. 3.—Current ratings for three-core (curves (a) to (d) and trefoil groups of single-core (curve (e)) 660-V paper-insulated cables

Curve Reference	Conductor Initial Deg C	Temperature Final Deg C
(a) Laid direct, armoured and served overall	15	70
(b) In air, wire-armoured left bright	25	70
(c) In single-way ducts, armoured left bright	15	70
(d) In single-way ducts, lead-covered only	15	50
(e) Laid direct, unarmoured (bonded at both ends) ...	15	70

For unarmoured cables drawn into ducts the maximum core temperature permitted is 50 deg C which results in a much lower rating (curve d). This reduced temperature rise is necessary to limit the danger of abrasion to the metallic sheath resulting from expansion and contraction of the cable owing to changing load conditions. For detailed data and tables of permissible current-carrying capacity, see references 6

and 7 of the bibliography given on next page.

When several cables or groups[8] of cables laid direct in the ground are run close together mutual heating between them lowers the permissible loading to the value obtained when the rating for one cable, laid direct, is multiplied by the grouping factor obtained from Fig. 4, depending on the method of grouping. Heat dissipation from cables erected in free air is much greater than from cables laid direct and *no reduction* need be made to the rating of grouped cables in air providing the minimum spacings in Table 2 are adopted.

When the voltage to earth exceeds 660 it is necessary to say whether the centre point of the system is earthed or unearthed. In B.S. 480-1942 it is stated that " a system may be considered as an earthed system when the neutral point is permanently connected to earth through a suitably low impedence or when a device is installed which automatically and instantly cuts out any part of the system which has become earthed." Earthed cables have a reduced thickness of belt insulation applied over the laid up cores compared with unearthed cable; consequently their overall diameter, weight and consequently cost are lower.

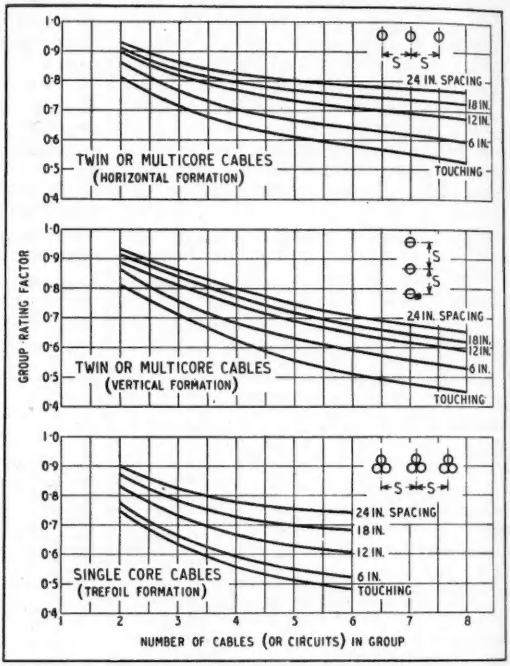


Fig. 4.—Grouping factors for impregnated paper cables laid direct in ground. S = axial spacing between centres of cables or of trefoil groups

The rating of single-core paper-insulated lead-covered cables used on a.c. circuits requires special consideration on account of the heating effects of losses in the sheathing.[9] These heating losses are of two types: viz.—sheath-eddy loss and sheath-circuit loss. Sheath-eddy loss (due to the eddy currents generated in the lead sheath by the alternating magnetic field which surrounds the conductor) is generally small compared with the sheath-circuit loss. Sheath-circuit loss occurs only when two or more sections of the lead sheath are bonded together, e.g., by earthing the sheath at various points on the cable route. If the sheaths are not earthed at both ends of the cable run, induced (or " standing ") voltages are produced which may be of the order of 20 V per 100 yd length of cable for normal installations.

Owing to the small value of sheath impedance, accidental contact between the sheaths (e.g., due to damaged servings, or shorting by a spanner) may result in a heavy flow of current and sparking with serious pitting of the lead sheaths. Also these " standing " voltages may, under short-circuit conditions, constitute a serious danger to life and property. In this country it is standard practice to bond and earth the sheaths of single-core cables at both ends of the run, and current rating tables are computed on this basis.

Armour losses in normal multicore cables are not of importance in regard to current rating for conductor sections less than 0·3 sq in. Armoured single-core cables, however, are very seldom used on a.c. circuits where the conductor size exceeds about 0·1 sq in. (19/083) because circulating currents are induced in the sheath and steel wires by the flux encircling the core, thus giving rise to heavy additional heat losses in both.

When larger conductor sizes used on a.c. systems must be wire-armoured, the choice of non-magnetic wire armouring is restricted by the mechanical properties and resistivity of the armouring material. In general, where non-magnetic wire-armoured single-core cables are installed not more than 6 in. apart, the lowest loss is obtained with a relatively high resistance material, e.g., copper-silicon-manganese alloy. For greater spacings a low-resistance material is generally more suitable, such as hard-drawn aluminium alloy.

An armouring is sometimes employed in which a percentage of non-magnetic wires is distributed among the steel wires in order to increase the magnetic reluctance and keep the losses to a minimum. Low losses can also be obtained with bronze wires, and by the use of non-magnetic steel. Non-magnetic armourings are, however, very expensive and it is essential to give full details of the proposed method of installation to ensure that the most economic type is used.

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Lighting at R.A.F. Stations

THE wartime growth in size and number of working, living and recreational quarters on R.A.F. stations rendered their emergency lighting plants unequal to the increasing electrical loads. Instead of trying to obtain more and bigger engine-driven generating sets from already overburdened manufacturers, the d.c. bias system of control, which was introduced in 1937 for street lighting by Standard Telephones & Cables, Ltd., was installed to avoid overloading by isolating and restoring non-essential circuits simply by pressing buttons in the watch office. The system was installed at 118 R.A.F. stations, involving the provision of 8,000 receiving units, which were quickly erected by local contractors.

Swedish Foreign Trade

Decline in Electrical Imports

IN 1938 Sweden imported rather more electrical machinery than she exported. Germany supplied more than half the imports. The United States came next but with only a quarter as much as Germany, with the United Kingdom third on the list with half America's share. Recently published returns show that the trade as a whole declined in value in 1944 by about 25 per cent. Decreases were very marked in power plant and lamps, while the only increases worth mentioning were in telegraph and telephone apparatus (not radio) and electro-medical apparatus. Germany dominated the market while Switzerland increased her share in a number of lines. Great Britain's participation was naturally negligible.

Regarding the future share of the United Kingdom in the electrical import trade of Sweden it is difficult to form a long-term opinion. In a report on the market written early in April, Mr. H. L. Setchell, H.M. Commercial Counsellor in Stockholm, pointed out that Swedish industries have considerable financial resources and are anxious to improve their efficiency by the installation of modern plant and equipment. There will accordingly be a good market for capital equipment for many years to come. Germany, which formerly furnished a very large proportion of import requirements of this kind, will be out of the picture. At the same time it must not be overlooked that while Britain is reorganizing her factories and striving to meet all demands, Sweden is at least as capable of augmenting her capacity for producing capital goods.

There have recently been numbers of developments in electrical manufacture. These include measuring instruments, telephone and radio equipment, porcelain and earthenware accessories, mica condensers and electric vehicles. In addition the manufacture of small motors is to be increased. But on the other hand, the demand for many descriptions of electrical material has been greatly enhanced by the erection of new hydro-electric power plant and the furtherance of railway electrification.

According to statistics recently released in Stockholm, Sweden's exports of electrical machinery and apparatus in 1944 showed a decline in value of about 9 per cent on 1943. The grand total was 33,436,000 kronor whereas the aggregate value of imports was 54,854,000 kronor. In 1938 the balance was the other way. There were declines in power plant except the larger sizes, vacuum cleaners and telegraph and telephone apparatus, except radio. On the other hand accumulators and parts, heating appliances and electro-medical apparatus showed advances. The outstanding addition to Sweden's customers was Soviet Russia. The value of the Swedish kronor has recently been raised from 17 to 14·50 to the £.

Australian Trade

Imports and Exports in 1943-44

FULL details of the overseas trade of Australia are now available for 1943–44. Total imports of electrical goods were valued at £4,851,000 compared with £5,044,000 in 1938–39. The values of the principal items are shown in the accompanying table with a note of increase or decrease on 1938–39. The decline was largely accounted for by the falling off in the imports of power plant, cables, and heating and cooking appliances.

In 1943–44 Australian exports of electrical goods included storage batteries for motor vehicles valued at £A5,100; dry batteries, £A9,300; other accumulators or batteries and parts, £A11,600; covered cable and wire, £A40,400; motors and generators, £A9,200; refrigerators and parts, £A16,500; radio receivers, £A3,300; transmitters, £A1,500; valves, £A8,400; radio parts, £A5,700; other electrical machinery, appliances and materials, £A72,000. The total value was £A183,000 and the principal markets were New Zealand (about half), Pacific islands, and India. In 1944–45 it was £A299,000 and in 1938–39 £A312,560.

Class	1943–44 £(000)	Inc. or dec. on 1938–39 £(000)
Dry cells	43	+ 39
From United Kingdom	2	− 1
„ United States	41	+ 40
Nickel alkaline batteries	8	− 4
From United Kingdom	2	+ 1
„ United States	6	− 5
Storage batteries for motor vehicles	8	+ 5
From United States	7	+ 6
Other batteries and parts	27	+ 9
From United Kingdom	2	− 1
„ United States	18	+ 4
Cable & wire, cotton-covered	13	+ 7
From United Kingdom	10	+ 5
„ Canada	3	+ 3
Telegraph & telephone cable	156	+ 83
From United Kingdom	89	+ 43
„ United States	66	+ 40
Light & power cable, paper-insulated, lead covered	66	− 100
From United Kingdom	42	− 118
„ United States	24	+ 18
Other cable & wire for light & power	767	− 81
From United Kingdom	385	− 394
„ United States	378	+ 373
„ Canada	2	− 1
Other covered cable & wire	12	− 128
From United Kingdom	7	− 94
„ United States	3	− 2
Motors under 1 H.P. (separate)	56	− 116
From United Kingdom	39	− 48
„ United States	16	− 10
„ Canada	2	+ 2
Switch units above 15 kV	64	− 167
From United Kingdom	57	− 163
„ Switzerland	8	+ 8
Reactors, voltage regulators, etc.	16	− 23
From United Kingdom	11	− 16
„ United States	3	− 4
Lightning arrestors other than radio	11	− 5
From United Kingdom	1	− 1
„ United States	10	− 4
Liquid slip regulators, thrustors, etc.	6	− 20
Generators, induction	54	− 100
From United Kingdom	39	− 79
„ United States	15	− 9
Generators, a.c. variable speed commutator type	1	− 10
Other a.c. generators	17	− 97
From United Kingdom	16	− 76
Other d.c. dynamo-electric machines	86	− 133
From United Kingdom	60	− 106
„ United States	25	+ 5
Alternators for turbines	102	+ 32
From United Kingdom	101	+ 53

Class	1943–44 £(000)	Inc. or dec. on 1938–39 £(000)
Relays, switches, fuses, cut-outs, etc.	109	− 35
From United Kingdom	82	− 16
„ United States	24	− 4
Lamps, filament, automobile	21	− 22
From United Kingdom	20	− 2
Lamps, under 20 V including torch flashlights	46	+ 18
From United Kingdom	15	+ 2
„ United States	23	+ 23
„ Canada	7	+ 7
Lamps, 20 V and over, gas-filled	13	− 58
From United Kingdom	8	− 57
Other lamps, 20 V and over	4	− 16
From United Kingdom	2	− 13
Heating & cooking appliances	22	− 111
From United Kingdom	15	− 75
„ United States	6	− 3
Measuring & recording instruments	117	− 38
From United Kingdom	93	+ 18
„ United States	22	− 5
„ Switzerland	2	—
Regulating & controlling apparatus	88	− 56
From United Kingdom	30	− 83
„ United States	22	− 2
Rectifiers	39	+ 5
From United Kingdom	18	− 4
„ United States	21	+ 13
Static transformers under 66,000 V	52	+ 23
From United Kingdom	30	‡
„ United States	22	‡
Static transformers 66,000 V and over	7	− 38
Telegraph instruments & apparatus	55	+ 36
From United Kingdom	19	‡
„ United States	36	‡
Telephones	147	+ 57
Telephone switchboards & appliances	503	− 440
From United Kingdom	357	− 422
„ United States	145	− 1
Electric vacuum tubes	10	+ 2
From United Kingdom	2	+ 1
„ United States	8	+ 4
Radio valves	324	+ 184
From United Kingdom	102	+ 28
„ United States	188	+ 141
„ Canada	35	+ 31
Radio receiving sets	241	+ 218
From United Kingdom	47	+ 37
„ United States	193	+ 191
Radio parts	637	+ 551
From United Kingdom	132	+ 95
„ United States	501	+ 472
Electrical appliances n.e.i.	514	+ 358
From United Kingdom	383	+ 280
„ United States	122	+ 85

‡ Comparable figures not available.

COMMERCE and INDUSTRY

Further Purchase Tax Exemptions. Overseas Telephone Orders.

Purchase Tax Concessions

THE remissions and reductions of purchase tax announced by the Chancellor of the Exchequer recently took effect this week. The alterations are set out in Notice No. 78F issued by the Commissioners of Customs and Excise, City Gate House, 39-45, Finsbury Square, E.C.2. They apply to goods delivered on sale or appropriated to retail trade or similar purposes on or after July 22nd, and to imported goods entered with the Customs or delivered from bonded warehouse for home consumption on or after that date. The exemptions from tax include "smoothing irons and pressing irons, being irons of a kind used for domestic purposes" (billiard table irons remain chargeable at the rate of 33⅓ per cent); "electric dry batteries of not more than 6 volts"; and "projectors for slides (including projectors for film strips but not including epidiascopes or cinematograph projectors). Lenses, and other parts of, and accessories to, projectors for slides."

Export Conference

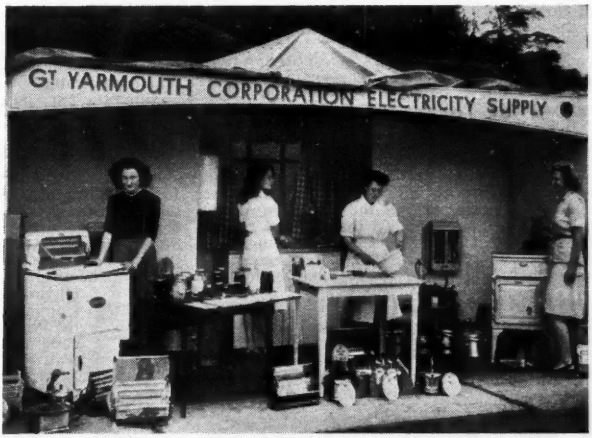
The Federation of British Industries is to organize a two-day conference on exports to be held in the Central Hall, London, on November 27th and 28th, when practical problems facing industry in the drive for exports will be defined and discussed. At the first session, Sir Stafford Cripps, President of the Board of Trade, will speak on the significance of exports to the national life, and, in succeeding sessions, speakers with wide experience of export problems will give papers on such themes as the respective functions of the Government and of industry in promoting exports, production for export and its relation to production for the home market, and on export selling methods. The conference will be opened by Sir Clive Baillieu, K.B.E., C.M.G., president of the Federation, and the chairman will be Mr. Leslie Gamage, M.C., vice-chairman and joint managing director of the General Electric Co., Ltd.

Indian Manufacturers' Visit

A small delegation from the All-India Manufacturers' Organization, headed by Sir Mokshagundam Visvesvaraya, K.C.I.E., arrived in this country recently so that the members could bring themselves up to date concerning modern industrial methods and make personal contacts with those industrialists in Great Britain who wish to enter into manufacturing relationships with their Indian counterparts. In meeting the delegation, members of the Council of the British Engineers' Association were able to afford preliminary guidance as to the changes in this country which are to be found in the engineering manufacturers' sphere.

Electrical Exhibit at a Garden Fete

A garden fete was recently held in the grounds of Kirby Cane Hall, Norfolk, in order to raise funds for the electrical installation of the village church. One of the attractions was an electrical exhibit arranged by the Great Yarmouth Electricity Department, and the profit realized from the sale of electrical apparatus was credited to the funds. The photograph of the stand which we reproduce was sent to us by Mr. G. T. Allcock, engineer and manager of the Great Yarmouth electricity undertaking.



An electrical display by Great Yarmouth Electricity Department at a garden fete

G.E.C. Telephone Contracts

A number of important orders for overseas are in hand at the Coventry telephone works of the General Electric Co., Ltd. One has been received from Brazil for 15,000 telephones and local switchboards of a total value of £50,000. The Uruguayan Telephone Administration has ordered 15,000 automatic telephones for Montevideo, and the Chinese Government requires 5,000 portable telephone sets, power board equipment and local switchboards to establish a temporary form of communications while the permanent telephone system is being re-established. A large quantity of telephone equipment has been ordered by the Netherlands East Indies Purchasing Administration for Batavia.

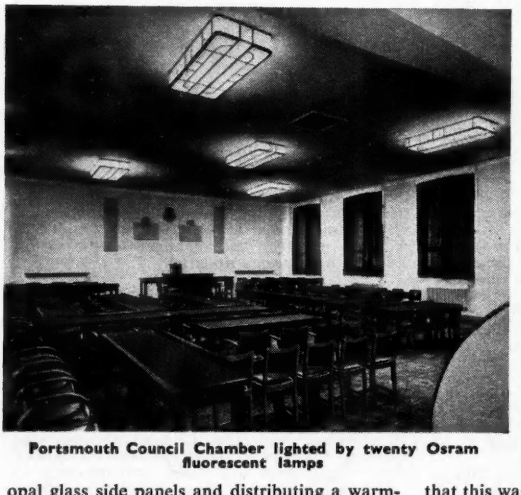
Two of Britain's famous ocean-going liners are being equipped with new internal telephone installations. The G.E.C. is supplying 500 ivory-coloured telephones for the *Queen Elizabeth* and more than 450 telephones for the *Dominion Monarch*. The G.E.C. telephone installation in the *Queen Mary*, consisting of 585 lines, is being reconditioned.

Contracting Industry Orders Revoked

The Minister of Labour and National Service has made the Essential Work (Electrical Contracting Industry Orders) Revocation Order, 1946 (S.R. & O. 1946 No. 1102, Stationery Office, 1d.). This revokes the two Essential Work Orders made in 1942 and 1945.

Fluorescent Lighting at Portsmouth

As a result of enemy action during the war the main city administrative departments at Portsmouth have had to be housed in what was originally a private hotel. Of particular interest is the system of artificial lighting installed in the temporary council chamber. This system comprises five laylights each incorporating four 80-W Osram fluorescent lamps; two of the "warm-white" type and two "daylight" lamps. The laylights are 5 ft 6 in. long, 2 ft 6 in. wide and 8 in. deep and were specially designed by the G.E.C. for the council chamber. The framework of each is of bronze and embodies a combination of flashed opal and reeded glass panels. The daylight lamps are situated immediately over the reeded panels on the face of the laylight so that natural colour light is projected down on to the councillors' desks below. The warm-white lamps run down each side of the laylights, thus illuminating the opal glass side panels and distributing a warm-tone light to the surrounding atmosphere.



Portsmouth Council Chamber lighted by twenty Osram fluorescent lamps

This arrangement is not only effective from the aesthetic point of view; it provides well-diffused light of excellent quality. The general level of illumination is approximately 12 lumens per sq ft at 3 ft from the floor. The installation was carried out under the direction of Mr. R. H. Coates, engineer and manager of the Portsmouth electricity undertaking.

Gloucester Exhibition

The City of Gloucester Electricity Department organized an exhibition of electrical farming equipment from July 13th to 23rd, which was opened by the Duke of Beaufort, supported by the Mayor of Gloucester, Alderman Clift (chairman of the Electricity Committee) and Mr. Emil Braathen (chief engineer and general manager). The exhibition was designed to show the many ways in which electricity and electrical apparatus can help the farmer. The farmer's wife was not forgotten and an extensive display of domestic apparatus was also on view. Mr. Braathen pointed out that, in the case of Gloucester, the consumer was paying to-day the same price per kWh as he paid before the war. In view of the very heavy increases in prices which had taken place with practically all other commodities, it was an encouraging fact that the Electricity Department had not increased its prices and the "halfpenny unit" was available, not only for all domestic purposes, but for all farm purposes as well.

Supply Companies Lose Action

In the Ulster Division Court, Belfast, Lord Justice Babington and Mr. Justice MacDermott refused with costs against the two companies concerned the motion of the Antrim Electricity Supply and the Antrim Electricity Distribution Co. to have a conditional order of certiorari made absolute for the purpose of having all orders made by the Ministry of Commerce confirming No. 8 Electricity Development Scheme for certain areas in the counties of Antrim and Londonderry quashed. Lord Justice Babington said that in his opinion the scheme was a proper distribution one under the Statute and one which the Ministry was entitled to confirm under the Act.

Electric Vehicle Decision

The Birkenhead Co-operative Society and an employee, Stanley Robert Glass, were recently jointly summoned at the Birkenhead Police Court for failing to keep a record of working hours and journeys and also for failing to report an accident. The prosecution contended that the truck was a mechanically operated vehicle under the Road Traffic Act and therefore the driver should keep a log of hours worked. The vehicle was operated under a "C" licence and the driver was required to carry a driving licence.

For the defence it was contended that this was not a motor vehicle nor was the defendant a driver, in the sense of the regulations. The truck was pedestrian controlled, for defendant walked in the roadway steering the vehicle by means of a lever and never actually mounted the vehicle.

The chairman of the bench said it was agreed that the truck was a mechanically propelled vehicle requiring a licence and that it was necessary for the person in charge of it to have a licence before he could operate the vehicle on a public highway. Therefore he was a driver within the meaning of the Act and the provisions regarding the keeping of records applied in the case of goods trucks of the type in question.

The summonses against the driver were dismissed on payment of 4s. costs. The Co-operative Society was fined £1. The magistrates indicated that they were prepared to state a case if asked to do so.

United States Exports

Certain statistics of the export trade of the United States, differentiating lend-lease and supplies for Unrra from cash transactions have now been issued from Washington, thus giving some insight into more normal trade tendencies. The accompanying table shows the trend over twelve months of the exports, purchased for cash, of electrical machinery and apparatus.

AMERICAN ELECTRICAL EXPORTS

Class	1936–38	2nd qtr 1945	($000) 3rd qtr 1945	4th qtr 1945	1st qtr 1946
Electrical machinery and apparatus	8,500	10,430	9,660	11,530	14,700
Including :					
Generating and generating sets	399	1,700	1,530	1,430	2,030
Motors, starters and controllers	636	1,170	1,100	1,170	1,170
Refrigerators and parts	1,604	302	320	706	1,240
Household and domestic appliances except lamps	466	142	125	267	519
Radio apparatus	2,319	1,494	1,453	1,690	2,229

Utrecht Trade Fair

In connection with the Utrecht Trade Fair which is to be held from September 10th to 14th, Mr. J. S. Hartog, 9, Radnor Lodge, Sussex Place, W.2, has arranged two tours—from September 9th to 14th and from September 13th to 19th. Those wishing to take part in these tours are reminded that they must have valid passports and obtain a visa from the Netherlands Consul-General, 33, Weymouth Street, W.1.

Contract Price Adjustment Formulæ

The latest figures for the B.E.A.M.A. contract price adjustment formulæ are as follows:—Rates of pay for adult male labour at July 13th, 103s. (same). Cost of material: the index figure for intermediate products last published by the Board of Trade on July 13th is 192·2 and is the figure for the month of June (compared with 191·5 for May).

Employment of Blind Workers

After an experimental period lasting two years Philips Lamps, Ltd., is able to undertake the employment of totally blind persons for work which has hitherto been considered quite unsuitable for them. It is hoped to employ 30 blind persons at Mitcham within the next twelve months. Mr. G. A. Taylor, the training supervisor of Mitcham Works is in touch with the local Labour Exchanges who are to arrange for the supply of blind persons. Stamping machines, and power presses exerting a pressure of over 25 tons are now regarded as standard types of machine for operation by the blind of both sexes. The safeguarding of blind people from injury whilst operating the power machinery has been a major consideration throughout and special types of guard on the presses have been incorporated, ensuring that hands and arms are fully withdrawn from working parts before action takes place. All guards are approved by the safety officer and works doctor before installation.

Proposed Pottery Health Regulations

The Minister of Labour and National Service has given notice that he proposes to make special regulations governing certain processes in the manufacture or decoration of pottery. These will supplement the provisions of the existing Pottery Regulations, and in particular will prohibit the use of glazes other than "leadless" or "low solubility" glazes and restrict the use of ground or powdered flint or quartz in factories where the manufacture or decoration of pottery is carried on. They take the place of the previous draft Pottery (Health) Special Regulations published in February last, to which certain objections were made. The revised draft contains amendments designed to meet some of these objections, particularly in regard to the use of the process known as "dry mixing." Copies of the Pottery (Health) Special Regulations, 1946 (Revised Draft), may be purchased from the Stationery Office (price 1d.), and any objections by or on behalf of persons affected must be sent to the Minister on or before August 12th.

New Cable Repair Ship

Swan, Hunter & Wigham Richardson, Ltd., Wallsend, have received an order from Cable & Wireless, Ltd., for a cable repair ship for delivery early in 1948. The vessel will be 300 ft long and will have a coiling capacity of 18,000 cu ft equal to 400 miles of cable. The vessel will be called Edward Wilshaw after the chairman of Cable & Wireless.

Pye Television School

The Television School conducted by Pye, Ltd., Cambridge, has now been running continuously since February 25th last. About two hundred students have received the full course training and the great majority of them have passed the final test. Two ten-day courses are run concurrently, one in the morning and the other in the afternoon, to suit those students who can easily travel to and from the school. An occasional five-day course, with sessions in the morning and afternoon, is organized for the convenience of students who normally live some distance from the school, but reside in the

locality for the duration of the course. The course is essentially practical, and is approached throughout from the viewpoint of the service engineer. Those who wish to take this training course should write to the Service Manager, Pye, Ltd., Cambridge.

Motor Industry's Jubilee Exhibition

A model of the Bersey electric taxi in service in the 1890's is one of the interesting items in an exhibition which the Society of Motor Manufacturers and Traders is holding at 148, Piccadilly, London, W.1, to celebrate the jubilee of the motor industry. Each development in motor design is related to the social, economic and industrial history of the period.

Dissolution of Partnership

Mr. J. Tweedie and Mr. W. O. Curry, carrying on business as electrical engineers at Stocksfield, Northumberland, as Tweedie & Curry, have dissolved partnership. Mr. Tweedie will attend to debts and carry on the business in his own name.

Prague International Fair

The first Fair since the war will take place in Prague from September 15th to 22nd. The international character of the Fair will be accentuated by official exhibitions of some foreign countries, apart from numerous displays by individual foreign firms.

Changes of Name

Philco Radio & Television Corporation of Great Britain, Ltd., has changed its name to Radio & Television Trust, Ltd.

The name of Baldwin Electrical Co. (Sheffield), Ltd., has been changed to Baldwin & Francis, Ltd.

Trade Announcements

R. S. Amplifiers, Ltd., under the managing directorship of Mr. R. Salmon who, up till the outbreak of war, was manager of the Radio and Sound Equipment Department of Selmer, have now moved to a new and larger factory at Reynolds Road, Acton Lane, London, W.4 (telephone: Chiswick 1011/3).

Maurice Broadbent, electrical contractor, has removed to Station Road, Skelmanthorpe, Huddersfield.

Trade Publications

Santon, Ltd., Somerton Works, Newport, Mon.—Illustrated catalogue of water-heating apparatus, including the new "Duo Circ-stat" dual purpose unit, single-element anti-freeze immersion heaters, industrial immersion heaters, dispense boiler for hotels, etc. A useful calculator gives immediately the capacities of cisterns and cylinders.

Resistances, Ltd., 30, Oxford Road, Finsbury Park, London, N.4.—Illustrated and priced catalogue of ceramic embedded, enamelled and non-vitreous porcelain, mica base and toroidal resistances, including stoppers for high frequencies and high voltages.

Acru Electric Tool Manufacturing Co., Ltd., 123, Hyde Road, Ardwick, Manchester, 12.—Illustrated and priced leaflet on a universal soldering, brazing, arc and resistance welding outfit.

Alar, Ltd., 6, Old Jewry, London, E.C.2.—Technical data sheet (00·12) on aluminium silicon casting alloy.

Underwood (Electric), Ltd., 200, Great Portland Street, London, W.1.—Illustrated and priced leaflet describing the "Scroll Light" bed lamp and wall bracket.

Applicants should write on their firms' business notepaper.

Annual Holidays

The works of the Dubilier Condenser Co. (1925), Ltd., will be closed from July 27th until August 5th inclusive. A small staff will deal with emergency matters but no dispatches will be made.

Messrs. W. H. Sanders, engineers, announce that their Stevenage works will be closed from July 26th to August 7th.

TRADE MARKS

THE following applications have been made for trade marks. Objections may be entered within a month from July 17th:—

S. (design). No. 636,101, Class 9. Electrical instruments and apparatus not included in other classes.—Safco-Trévoux, 40 Rue de la Justice, Paris. Address for service: c/o Marks & Clerk, 57/58, Lincoln's Inn Fields, London, W.C.2.

TOASTMASTER (design). No. 639,333, Class 9. Electric coffee makers.—McGraw Electric Co., 120, South La Salle Street, Chicago. Address for service: Marks & Clerk, 57/58, Lincoln's Inn Fields, London, W.C.2.

PERMOFLUX. No. 639,488, Class 9. Electro-acoustical transducers included in Class 9 and electrical transformers.—Permoflux Corporation, 4916, West Grand Avenue, Chicago. Address for service: Stevens, Langner, Parry & Rollinson, 5-9, Quality Court, Chancery Lane, London, W.C.2.

TELEFUSION. No. B640,028, Class 9. Instruments, apparatus, systems and parts thereof (not included in other classes) for the production, transmission, reproduction, control, measurement or indication of signals of sound-wave frequency or of television or other image signals.—Central Rediffusion Services, Ltd., Carlton House, Regent Street, London, S.W.1.

SUCAL (design). No. 640,240, Class 9. Electrical apparatus and instruments not included in other classes, scientific apparatus, etc.—Callender-Suchy Developments, Ltd., Hamilton House, Victoria Embankment, London, E.C.4.

MEMRAY. No. 640,441, Class 11. Heating apparatus.—Midland Electric Co., Ltd., M.E.M. Works, Reddings Lane, Tyseley, Birmingham, 11.

CAPOTHENE and CAPOVIN. Nos. 638,200 and 638,201 respectively, Class 17. Electrical insulating material.—Cables & Plastics, Ltd., 9-13, Newton Road, Leeds, 7.

ARMOUR BRAND (design). No. 639,987, Class 17. Insulating materials.—Griffiths Bros. & Co. (London), Ltd., 29, Macks Road, Bermondsey, London, S.E.26.

ELECTRICITY SUPPLY

Progress of Power Station Schemes. County Co. Tariff Concession.

Acton.—JOINT BOARD SCHEME REJECTED.—At a recent meeting of the General Purposes Committee it was reported that in reply to further representations made to him by the Ealing Borough Council in connection with the formation of a joint electricity board for the areas of Acton, Brentford and Chiswick, Ealing, Hayes and Harlington, Heston and Isleworth and Southall, the Minister of Fuel and Power had indicated that the present time was not opportune to consider this matter in view of the Government's announced intentions regarding the nationalization of the electricity supply industry.

Bedford.—ADDITIONAL H.V. CIRCUIT.—The Electricity Committee is to install a second 132-kV circuit between the Clapham Road and Austin Canons substations and provide a second 30,000-kVA transformer at the latter at a cost of £16,336.

Bournemouth.—NEW POWER STATION.—Preliminary work has been started by Sir Robert McAlpine & Sons on the site of the Bournemouth & Poole Electricity Supply Co.'s new power station at Holes Bay.

Bristol.—RELEASE OF DEPARTMENT'S PREMISES.—The new electricity premises, which during the war were used as an aero engine factory, may soon be handed back to the Corporation. This was stated by Mr. W. A. Wilkins, M.P., chairman of the Electricity Committee at a recent meeting of the City Council. He added that they had already installed the meter department in one part of the buildings which had been released.

YEAR'S TRADING.—In 1945-46 both the number of kWh sold (423 million) and the number of consumers (120,893) established new records. A decrease of 12 million kWh sold to industry for war production was offset by the higher sales for lighting and domestic purposes.

Cannock.—PRICE INCREASE.—Owing to increased prices of coal and other materials, the Urban District Council has decided to raise electricity charges by 5 per cent to ordinary consumers, and by 10 per cent to flat-rate power consumers.

Corsham.—ELECTRIC LIGHTING CONTRACT.—After considering quotations from the Bath Gas Co. and the Wessex Electricity Co. the Council has unanimously decided to adopt electric street lighting, the total annual cost being £786. It is hoped that the town area scheme will be in operation by September 1st and the rural area, Neston and Gastard schemes as near this date as possible.

Croydon.—CONTRACT FOR STEELWORK.—In regard to the allocation of the steelwork contract for the new power station the Electricity Committee reports that it is advised that the steelwork contractors' prices are regulated and that in the event of tenders being invited, quotations would be identical. It has therefore been suggested that negotiations be opened with one company.

UNIFORMITY OF STREET LANTERNS.—The Electricity Committee recommends the purchase of all street lighting equipment from the Revo Electric Co., Ltd., in order to secure uniformity of appearance.

ELECTRICITY FOR ESTATES.—A supply is to be provided to the Addington House estate at a cost of £5,176 and to the Addington golf club estate (£10,602).

Darlington.—LOANS SANCTIONED.—The Electricity Commissioners have sanctioned the borrowing of the following amounts by the Town Council:—£4,051 for mains and plant; £3,875 for mains, etc., for Paton & Baldwins' factory; £1,595 for rectifier equipment for the Willows Road substation; £5,344 for mains and plant; £1,932 for mains and plant for new factory at Cockerton; £965 for mains and plant for Crossley's brickworks; and £5,000 for substation equipment.

Edinburgh.—PROPOSED NEW TARIFF.—New electricity charges proposed for Edinburgh were remitted for further consideration by the Corporation Public Utilities Committee on July 19th. They provide for a charge of 3d. per kWh with all kWh over an assessed number at ½d. The assessed number would be calculated as follows: First room, 60; next three rooms, 40; next three rooms, 30; remaining rooms, 20. D.C. supplies, 20 per cent. more. Mr. J. F. Field, electricity manager, stated that certain classes of domestic consumers, particularly those in one-roomed houses, were paying too little and those in large houses too much. The scale had been formed in equity to all classes of consumer.

Fulham.—STANDARDIZATION OF SYSTEM.—Recently the Council approved a scheme for the standardization of the high-voltage distribution system at a cost of £157,280. In order that as much equipment as possible may be installed before next winter's heavy load, the Electricity and Lighting Committee has placed contracts aggregating £13,511 with the Metropolitan-Vickers Electrical Co. (switchgear modifications), A. Reyrolle & Co. (circuit breakers and fuse isolators), English Electric Co. (transformers) and Aberdare Cables (h.v. and l.v. cables).

Hackney.—APPLIANCE HIRE CHARGES.—The Electricity Committee recommends that in view of the increased cost the hire charges for new cookers should be 9d., 11d., and 1s. per week. It is proposed to limit the hire of water heaters to the 12- and 1½-gallon types at 7d. and 3d. per week respectively and apply these charges to all water heaters issued after September 1st. It is not recommended that the present charges for wash-boilers shall be increased.

Hammersmith.—ESTIMATES OF EXPENDITURE.—The chief electrical engineer has submitted estimates of capital expenditure during the next two financial years. The total for 1947-48 is £193,500, the largest items being £80,000 for mains and services, £45,000 for substations, and £24,000 for hired installations and apparatus. For 1948-49 the figure is £240,000, including £100,000 for mains and services £55,000 for substations and £45,000 for installations and appliances.

London.—CHEAPER ELECTRICITY.—About 70,000 consumers in Kent, Essex, Surrey and Sussex will benefit from reductions ranging from 8 to 22 per cent as a result of a revision of the lighting flat rate tariffs in various areas announced by the County of London Electric Supply Co., Ltd., and its twenty associated companies.

Middlesbrough.—CAPITAL SCHEMES UP TO 1949.—Capital expenditure proposed to be incurred by the Corporation electricity undertaking up to March, 1949, includes £50,000 for new showrooms, offices, etc.; £27,500 for mains and services, in addition to £10,000 already sanctioned; £13,570 for additional meter testing equipment; £21,000 for hire purchase apparatus.

GAS WORKS SUBSTATION.—A substation is to be built at the Corporation gasworks at a cost of £500. Plant to deal with 250 kVA is to be installed and this will later be increased to 500 kVA.

North Wales.—RURAL ELECTRIFICATION.—At a meeting of the North Wales and South Cheshire Joint Electricity Authority, held at Llandudno, Lieut.-Col. J. Rankin, general manager of the North Wales Power Co., said the company had under consideration about 200 additional development schemes, mainly for rural areas, which would cost £350,000. The company had taken risks and he doubted whether any public body could have tackled and done the work it had carried out. The extensive hydro-electric scheme negotiations were advancing and a decision would have to be reached in the near future.

Preston.—OPENING OF NEW POWER STATION.—The Minister of Fuel and Power, Mr. Emanuel Shinwell, is to open the Ribble No. 2 power station on September 12th. By that time half the new station will have been completed and read for operation. The remainder will not be finished until early in 1948. It is hoped that a bridge being built over the River Ribble to facilitate coal supplies will be in use by the end of the year.

Scarborough. — LOAN APPLICATION. — The Town Council is applying to the Electricity Commissioners for sanction to borrow the following:—Specified works: Mains and services, £7,448; substation buildings, £1,382; equipment, £3,265. Unspecified works: Mains and services, £4,000; substation equipment, £1,500; and meters, £2,000. Application is also being made for sanction to a loan of £5,000 for electricity meters.

South Wales.—POWER STATION AT BARRY PORT ?—The *South Wales Evening Post* reports that a scheme for the construction of a large power station at Barry Port, submitted by the Llanelly & District Electric Supply Co., Ltd., is before the Central Electricity Board.

TRANSPORT

Austria.—RESUMPTION OF ELECTRIFICATION.—Work has recommenced on the electrification of the Austrian State Railways as part of a programme to convert 2,000 km (50 per cent of the total) within twelve years. This year electrification will commence on sections of the line from Attnang-Punchheim to Linz, Bischofshofen to Eben, and Spittal to Villach.

Cardiff.—FLUORESCENT LIGHTING ON TROLLEY-BUSES.—The Transport Committee has authorized the chief engineer to experiment with fluorescent lighting on two trolley-buses.

Floodlighting Control

FOR the control of colour sequence and dimming of the 72-kW of floodlighting of eighteen large fountains, waterfall, mill-wheel, bridge and trees in Saint James's Park during the victory illuminations, Ferranti moving-coil single-phase voltage regulators in 12-kW units (energized from petrol-driven 230-V 50-cycle generators) were used to provide the continuously variable voltage required at a high electrical efficiency as contrasted with the resistance control method.

Illuminations in St. James's Park

Each of the three colours employed was raised in turn from zero to maximum intensity, which was maintained for a short period that terminated with an instantaneous cut-off. During that period the next colour in the sequence was growing to its full intensity, so that a display of primary colour was followed by a gradual mixing of two colours. The regulators were loaded with one colour bank only from the minimum to the maximum position, at the latter point the whole of the load was transferred direct to the generator terminals.

The mechanical drive consisted of an induction-disc motor and spur gear and the colour sequence was determined by means of a limit switch at each end of the travel in conjunction with a double-pole three-position selector switch driven by the mechanism, these switches carrying control current only.

Acknowledgments are due to the Ministry of Works, which was responsible for the illuminations, in respect of the use of the accompanying photograph.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The English Electric Co., Ltd.—At an extraordinary general meeting of the company held on July 16th resolutions for increasing the authorized capital to £6,500,000 and approving the purchase of the whole of the issued capital of Marconi's Wireless Telegraph Co., Ltd., were carried unanimously.

Sir George Nelson, chairman and managing director, referred to his statement at the recent annual meeting of the company in which he mentioned the programme for extension of manufacturing, research and development facilities upon which the company had embarked. Their order book, he said, continued to justify these increased manufacturing facilities. The development programme was now being financed by means of temporary arrangements, and, in part, by ploughing back into the business a proportion of the company's earnings. Stockholders were now invited to substitute permanent capital for the temporary financial arrangements made to enable the necessary rate of expansion to be carried out.

Explaining the reasons for the purchase of the capital of Marconi's, Sir George said that the Marconi Co. had a research organization in the "electronic" field which compared favourably with any similar facilities that existed anywhere in the world. In recent years there had been a tendency for the two fields of heavy current and light current equipment to come closer together and it was clear that electronic devices would be increasingly used in their own heavy electrical industry. Another consideration was that by extending the activities of the English Electric group of companies into the communications field, the whole basis of the organization would become better balanced and thereby strengthened in competitive overseas markets. In purchasing the Marconi Co. they would also acquire a 42 per cent interest in the Marconi International Marine Co. and the entire interest in Marconi Instruments, Ltd. After referring to the terms of the sale, Sir George said that the total required to be raised as new capital was £5,000,000, and they had decided to raise £1,500,000 in the form of 3¾ per cent cumulative preference shares, and the balance of £3,500,000 by an offer of 1,179,577 ordinary shares to existing stockholders, at 57s. 6d. each, in the proportion of one new share for each £2 of ordinary stock held.

The directors announced last week the payment of an interim dividend of 4 per cent. This is the first interim dividend to be paid by the company, which in previous years has only paid a first and final dividend. For 1945 the dividend was 10 per cent.

The subscription list opened and closed on Wednesday for the 1,500,000 3¾ per cent £1 cumulative preference shares offered at par.

Marconi's Wireless Telegraph Co., Ltd., is to make a capital payment to the minority shareholders equivalent to 25s. per £1 preference or £1 ordinary share, and 12s. 6d. per 10s. ordinary share. The English Electric Co. will later make an offer to the minority shareholders for their shares, apart from the above capital payment.

An extra-ordinary meeting will be held on August 12th at which resolutions will be submitted approving the transfer of 2,529,413 shares held of Cable & Wireless, Ltd. (the operating company), to Cable & Wireless (Holding), and sanctioning alteration in the articles of association of the Marconi Co. If the alterations are approved, the present directors of Marconi's Wireless Telegraph Co., will resign and the following directors (all directors of the English Electric Co.) will be appointed: Sir George H. Nelson, Sir Edward Crowe, Brig.-Gen. W. H. Hayes, Mr. P. Horsfall and Mr. H. G. Nelson.

The Revo Electric Co., Ltd., reports a net profit for the year ended March 31st last of £279,259, as compared with £249,266 for the previous year. After providing for taxation, directors' fees, etc., and adding £83,166 brought in, there is a balance available of £160,386. It is proposed to place £25,000 to general reserve, £10,000 to stock contingencies reserve, and to pay a final dividend of 10 per cent and a bonus of 5 per cent, making 20 per cent for the year (against 17½ per cent). The balance carried forward is £85,880.

Christy Bros. & Co., Ltd., report a gross trading profit of £64,789 for the year ended March 31st last, as compared with £69,488 for 1944-45, and after deducting expenses and depreciation, there is a net profit of £36,905 (against £42,590), plus dividends and interest of £30,126. Tax and N.D.C. require £22,308, general reserve receives £5,000 and the ordinary dividend for the year is unchanged at 17½ per cent. The balance carried forward is raised from £22,877 to £24,788.

The Ebonite Container Co., Ltd., reports a net profit for the year to February 28th last of £14,901, as compared with £14,060 for the preceding year. The dividend for the year is maintained at 17 per cent, less tax, by the final payment of 5 per cent and a bonus of 7 per cent. The balance carried forward is £16,562 (against £16,110 brought in).

The Anglo-Portuguese Telephone Co., Ltd., reports a revenue for 1945 of £607,570, as compared with £577,998 for the preceding year, and a net profit of £55,517. The usual dividends of 8 per cent, less tax, are paid on the ordinary stock and the "A" ordinary shares, leaving £39,743 to be carried forward (against £39,600 brought in).

In his statement which accompanies the report and accounts Sir Alexander Roger (chairman) refers to the agreement with the Portuguese Government in relation to the law for the nationalization of capital promulgated in 1943. The agreement allows the company to increase its authorized capital as and when required to a total of £6,177,000. This it is estimated will cover a programme of £4,500,000, of which new money to the extent of £1,500,000 will be required over the next five years. The total capital up to this agreed limit will be exempt from the conditions of the Nationalization Law even if it becomes operative.

Already since the beginning of 1946 the company has shipped to Portugal over £200,000 worth of plant, which compares with only £100,000 during the whole six years from 1940 to 1945. It is also expected that during 1946 an extension to an existing exchange and two new main exchanges will come into operation, thus relieving the congestion. During 1945, 1,391 stations were added to the system, making a total of 65,205.

A sum of £136,000 placed on loan with the Telephone and General Trust has been withdrawn to pay for materials and the further finance for 1946 requirements will be advanced by the Trust. No new issue of capital is contemplated during 1946.

J. Stone & Co., Ltd.—Presiding at the recent annual meeting Mr. K. H. Preston (chairman), in the course of his speech said that while the labour position remained difficult, on the engineering side of their business they had orders on their books representing more than twelve months' output. An important side of their engineering business was the manufacture of electrical equipment for railways both at home and abroad. For the last six years very few railway companies throughout the world had been able to build new locomotives and rolling stock, or to maintain those already in service as they would have wished. Replacement programmes were now being put into effect, and it was anticipated that this department of the business would be kept busy for some time to come.

The Société Financière de Transports et d'Entreprises Industrielles (Sofina) is making a bonus issue of 400,000 shares in the proportion of two new shares for each old one held. It is proposed to increase the capital by transfer of a special reserve amounting to 200 million fr. and the creation of 400,000 new ordinary shares. The net profits for the years 1940-45 are as follows: 1940, 118,532,216 fr.; 1941, 81,350,397 fr.; 1942, 78,986,808 fr.; 1943, 50,063,694 fr.; 1944, 53,610,938 fr.; and 1945, 72,964,845 fr. Dividends are fixed at 250 fr. for 1940, 25 fr. for each year from 1941 to 1944, and 23.80 fr. for 1945. Total payment will be 356 fr. net.

Aberdare Cables, Ltd., reports a profit to October 31st last of £49,720, as compared with £37,618 for the previous year, to which is added £9,814 brought in. Deferred repairs require £6,500, taxation £30,575, and the dividend for the year is maintained at 6 per cent., less tax. The balance carried forward is £13,999.

The Rothermel Corporation, Ltd., reports a profit for 1945 of £17,444, after providing for E.P.T. and income tax. The final dividend is 12½ per cent, making 22½ per cent (against 20 per cent). The capital was increased in July last year.

Greenwood & Batley, Ltd., propose to pay a final dividend of 10 per cent, again making 15 per cent for the year.

Newman & Watson, Ltd., who for some years have made no distribution on the ordinary shares, have announced a dividend of 5 per cent.

E. K. Cole, Ltd., are paying an unchanged interim ordinary dividend of 8 per cent.

The Electrical Distribution of Yorkshire, Ltd., has declared an interim dividend of 4½ per cent (unchanged).

The Yorkshire Electric Power Co. is maintaining its interim ordinary dividend at 3 per cent.

New Companies

A. Jackson & Co. (Liverpool), Ltd.—Private company. Registered June 11th. Capital, £1,000. Objects: To acquire the business of electrical and radio engineers, carried on by Maud M. Jackson at 131, Granby Street, and 17, Childwall Valley Road, Liverpool, as "A. Jackson & Co." The directors are: Maud M. Jackson, 87, Childwall Road, Liverpool, 15, and W. H. Jackson, 4, Porlock Avenue, Childwall. Registered office: 17, Childwall Valley Road, Liverpool, 16.

Edward Wolf & Son, Ltd.—Private company. Registered June 20th. Capital, £1,000. Objects: To acquire the business of an electrical engineer and contractor and radio dealer carried on by E. M. Wolf as Edward Wolf & Co., at Portsmouth. E. M. Wolf, 37, Welch Road, Southsea, is permanent managing director. Registered office: 2, Albert Road, Southsea, Hants.

Progress Electrical (Norwich), Ltd.—Private company. Registered June 18th. Capital, £750. Objects: To acquire the business of an electrical and wireless engineer carried on by N. M. Craig at 30, Old Palace Road, Norwich. The directors are: N. M. Craig, The Catherine Wheel, St. Augustine's, Norwich, and two others. Registered office: 30, Old Palace Road, Norwich.

British Electronic Products, Ltd.—Private company. Registered June 24th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, all kinds of electrical, domestic and other appliances and accessories, etc. Directors: C. F. Jenvey, 139, Castlecroft Road, Wolverhampton, and E. W. Jones, 8, York Gardens, Wolverhampton. Registered office: Moxley Road, Bilston, Staffs.

Danum Electrical Co., Ltd.—Private company. Registered June 24th. Capital, £1,000. Objects: To acquire the business of electrical and mechanical engineers now carried on by A. W. Thompson and G. C. Richardson at 42/4, French Gate, Doncaster, as "The Danum Electrical Co." Directors: A. W. Thompson, 8, Cross Street, Wath-upon-Dearne, and G. C. Richardson, 38, St. Agnes Road, Belle Vue, Doncaster. Registered office: 42/4, Frenchgate, Doncaster.

Receivers—Appointed and Released

Waghorn Electrical Contractors, Ltd.—A. Scotter, 34-40, Ludgate Hill, E.C.4, was appointed receiver and manager on April 5th, 1946, under powers contained in debenture dated March 1st, 1945.

W. J. Atkins & Co., Ltd.—T. O. O'Shea, solicitor, of 84, Bridge Road, East Molesey, Surrey, was appointed receiver on April 12th, 1946, under powers contained in debenture dated April 3rd, 1945.

Bamford Works, Ltd.—E. Sugden, of 2, East Parade, Leeds, 1, ceased to act as receiver and manager on April 5th, 1946.

STOCKS AND SHARES

STOCK Exchange business continues to be fairly active, although the volume of trade flows somewhat spasmodically. Doubts continue to be raised as to whether the Government will be able to continue for long its cheap money policy, but for all that the prices of gilt-edged securities are well maintained, and the best-class industrial ordinary shares remain in demand. Speculation in radio shares has subsided to some extent. Cable & Wireless ordinary stock, after touching 118, fell back several points. A sharp rise in Calcutta Tramways is the principal feature amongst the Overseas companies' shares which appear in our price lists.

Company Results

Revo Electric's annual report bears out the good impression made by the preliminary profits statement, and the increase in the annual distribution from 17½ to 20 per cent. After rising to 56s. 6d., the price of the 10s. shares reacted to 55s. 6d., at which the yield on the higher payment is £3 12s. 6d. per cent. Ultra Electric (Holdings) accounts show an expansion of £3,000 to £16,500 in the revenue received from the operating subsidiary. The dividend is maintained at 10 per cent on a larger capital. Thorn Electrical Industries propose to offer new 5s. shares at 27s. 6d. to shareholders in the radio of nine new for every sixteen shares held. With the existing shares advanced 3s. 3d. to 36s. 3d., the rights to the offer are worth about 4s. 6d. per share.

General Electric Accounts

The full accounts of the General Electric Company confirm the expansion of £70,000 to £1,951,000 in the trading profit for 1945–46. The figure is struck after an unspecified allowance for E.P.T., and is, therefore, less illuminating than would otherwise be the case. Reference is made in the report to a large volume of current orders, and to rapidly expanding export business. Disappointment at the repetition of the dividend and bonus of 17½ per cent, 2½ per cent below the pre-war level, caused the price to ease off to 105s. ex dividend. Companies in the electrical engineering field are regarded as being outside the present scope of the nationalization policy, but the balance sheet item of over £6 millions, representing General Electric's interest in subsidiary and associated enterprises, includes items that may fall within the acquisitiveness of the Government.

Home Electricity

The market for Home electricity supply shares retains its previous firmness. Shares in some of the provincial companies are in steady demand. As previously mentioned, there are still a few nervous holders who sell their shares every time the fist of nationalization is shaken in the face of the industry. But these offerings are readily absorbed. The Yorkshire shares are in particular request; both Yorkshire Electrics and Electrical Distribution of Yorkshire ordinary, show rises on the month. Midland Electric Power has risen 1s., Bournemouth & Poole Ordinary at 64s. are 1s. 9d. higher since a month ago. The Scottish shares have been wanted from the North. Clyde Valleys and Scottish Power are up to £2 per share. The Clyde Valley Company is paying 8 per cent, and the Scottish Power Company 9 per cent, giving yields respectively of 4 per cent and 4½ per cent on the money.

English Electric Dividend

With the declaration of a 4 per cent interim dividend, English Electric have broken their long-established custom of making a single annual distribution to ordinary stockholders. At the company's extra-ordinary general meeting held last week, approval was given to the purchase of Marconi's Wireless Telegraph for £3,750,000 and to the necessary increase in the company's capital. Sir George Nelson gave a clear summary of the purposes for which the substantial sums of new money are required. Expansion and modernization of the manufacturing, research and development sides of the business are among the chief purposes. Another is, of course, the financing of the Marconi's Telegraph deal, which gives English Electric a direct interest of their own in the relatively new field known as "electronics." At 62s. 6d. ex rights, the ordinary shares give a yield of £3 4s. per cent. The company has offered this week, through Lazard Brothers & Co., 1,500,000 3¼ per cent preference shares of £1 each, at 20s.

New Issue Regulations

After due deliberation over the relative merits of "placings" and offers for sale as the means for marketing new issues, the Stock Exchange Council has decided in favour of the latter. This means a diminution of a procedure which has led to a great deal of dissatisfaction on the part of the average investor, who has frequently been unable to participate in a popular new introduction at or near the price of the "placing." From now on company prospectuses advertised in the papers will be largely in connection with an offer to the public to subscribe for shares, rather than "for information only" as a preliminary to a "placing" in the market.

Price Changes

Associated British Engineering have risen 25s. to 61s. 3d. on the increase in the dividend from 8 per cent to 12 per cent for the year. In addition, the fortunate shareholders are to receive a bonus of one Brush Electrical for every £1 A.B.E. stock. Brush at 11s. 3d. are 9d. lower on the month. Chloride Storage have

(*Continued on page* 161)

ELECTRICAL INVESTMENTS

Past Month's Price Changes

Company	Dividend Previous	Dividend Last	Middle Price July 19	Month's Rise or Fall	Yield p.c.
Home Electricity Ordinary					£ s. d.
Bournemouth and Poole	12½	12½	64/–	+1/9	3 18 2
British Power and Light	7	8	32/–	..	5 0 0
City of London ..	6	7	30/6	+6d.	4 11 10
Clyde Valley ..	8	8	40/–	+2/–	4 0 0
County of London	8	10	42/–	..	4 15 3
Edmundsons ..	6	6	27/6	..	4 7 3
Elec. Dis. Yorkshire	9	9	43/–	+1/–	4 3 9
Elec. Fin. and Securities ..	13½	15	59/–	..	5 1 8
Elec. Supply Corporation ..	10	10	43/6	−1/–	4 12 0
Lancs. Light and Power ..	7½	7½	31/6	..	4 15 3
Llanelly Elec. ..	6	6	26/–	+6d.	4 12 4
Lond. Assoc. Electric	4	6	25/6	−1/–	4 14 0
London Electric	6	6	26/–	−6d.	4 12 4
Metropolitan E.S.	8	9	42/–	..	4 5 9
Midland Counties	8	8	45/–	..	3 11 1
Mid. Elec. Power	9	9	43/6	+1/–	4 2 8
Newcastle Elec...	7	7	30/–	..	4 13 4
North Eastern Elec.	7	7	30/6	..	4 11 10
Northampton ..	10	10	48/–	..	4 3 4
Northmet Power	7	9	41/–	..	4 7 10
Scottish Power ..	8	9	40/–	+1/6	4 10 0
Southern Areas ..	5	5½	22/–	..	5 0 0
South London ..	7	7	31/–	+1/–	4 13 4
Yorkshire Elec...	9	9	44/–	+1/6	4 1 10
Public Boards					
Central Electricity:					
1963–93 ..	3½	3½	108	..	3 4 10
* 1974–94 ..	3½	3½	107	..	3 0 9
London Elec. Trans.	2½	2½	100	−1	2 10 0
Lond. Pass. Trans. Bd.					
A	4½	4½	124½	..	3 12 4
B	5	5	120½	..	4 3 0
C	3	3	58	−2	5 3 5
Overseas Electricity Companies					
Atlas Elec. ..	Nil	Nil	9/9	+3d.	—
Calcutta Elec. ..	6*	6*	64/–	+4/–	1 17 6
Cawnpore Elec...	13	13	59/3	−9d.	4 7 10
East African Power	7	7	45/–	+3/–	3 2 3
Jerusalem Elec...	5	5	24/–	−1/–	4 3 4
Madras Elec. ..	4	6	42/–	+2/–	2 17 2
Montreal Power	1½	1½	25½	+3½	—
Nigerian Elec. ..	10	10	43/–	+½	4 13 0
Palestine Elec. "A"	5*	6*	37/6	+2/–	3 4 0
Perak Hydro-elec.	6	7	17/–	−6d.	—
Tokyo Elec. 6%	6	6	37½	−3	—
Victoria Falls & Power	15	19	5⅝	−⅛	3 10 8
Whitehall Inv. Pref.	—	6	26/6	..	4 10 7
Equipment and Manufacturing					
Aron Elec. Ord.	10	15	68/9	..	4 7 3
Assoc. Brit. Eng.	8	12	61/3	+1¼	3 17 0
Assoc. Elec. :					
Ord.	10	10	70/–	..	2 17 2
Pref.	8	8	44/3	+1/–	3 12 5
Automatic Tel. & El.	12½	12½	76/6	−2/–	3 5 5
Babcock & Wilcox	12	12½	65/6	−6d.	3 16 3

Company	Dividend Previous	Dividend Last	Middle Price July 19	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
Baldwin, H.J. (2/–)	10	10	12/9	..	3 17 0
British Aluminium	10	8	42/6	..	3 15 2
British Insulated & Callender's ..	..	..	47/6	..	—
British Rola (2/–)	15	15	7/6	−6d.	4 0 0
British Thermostat (5/–)	18½	18½	25/6	..	3 12 6
British Vac. Cleaner (5/–)	30	30	27/6	−1/6	5 9 1
Brush Ord. (5/–) ..	9	10	11/3	−9d.	4 9 0
Burco (5/–) ..	15	20	25/–	..	4 0 0
Chloride El. Storage	15	15	5	+⅜	3 0 0
Christy Bros. ..	12½	17½	85/–	..	4 2 7
Cole, E. K. (5/–)	20	20	35/–	−2/–	2 17 2
Cossor, A. C. (5/–)	10*	12½*	37/6	−2/6	1 13 4
Crabtree (10/–) ..	17½	17½	52/6	..	3 6 9
Crompton Parkinson Ord. (5/–) ..	22½	22½	34/6	−1/6	3 5 3
De La Rue ..	40	40	123	+3	3 1 0
Decca (1/–) ..	100	112	56/3	−1/6	2 0 0
E.M.I. (10/–) ..	8	8	34/3	−1/9	2 6 9
Elec. Construction	10	12½	67/6	..	3 14 0
Enfield Cable Ord.	12½	12½	59/6	−1/–	4 7 0
English Electric	10	10	62/6xr	−3/–	3 4 0
Ericsson Tel. (5/–)	22*	20*	57/6	−1/–	1 14 9
Ever Ready (5/–)	40	40	50/–	−1/6	4 0 0
Falk Stadelmann	7½	10	50/–	+4/6	4 0 0
Ferranti Pref. ..	7	7	31/6	..	4 1 2
G.E.C. : Pref.	6½	6½	36/6	+6d.	3 11 4
Ord.	17½	17½	105/–	−1	3 6 8
General Cable (5/–)	15	15	23/–	+2/–	3 5 2
Greenwood & Batley	15	15	50/–	+1/9	6 0 0
H.T.A. (10/–) ..	12½	10	22/–	−1/6	4 11 0
Heatrae (3/–) ..	12½	12½	7/6	+3d.	3 9 0
Henley's (5/–) ..	20	20	28/6	−6d.	3 10 2
4½% Pref. ..	4½	4½	25/–	..	3 12 0
Hopkinsons ..	17½	20	5½	+½	3 16 2
Intl. Combustion	30	32½	9¾	+¼	3 6 6
Johnson & Phillips	15	15	85/–	−9d.	3 10 7
Lancashire Dynamo	22½	22½	6	..	3 14 6
Laurence, Scott (5/–)	12½	12½	11/3	−6d.	4 6 2
London Elec. Wire	7½	7½	43/9	+9d.	3 8 9
Mather & Platt ..	10	10	57/6	..	3 8 9
Metal Industries (B)	8½	9	60/–	+3/16	3 0 0
Mid. Elec. Mfg. ..	25	25	8¾	..	2 17 1
Murex	20	20	98/9	−½	4 1 0
Newman Ind. (2/–)	22½	22½	9/6	−3d.	4 5 6
Plessey (5/–) ..	20	20	38/9	−2/3	—
Power Securities	6	6	30/–	..	4 0 0
Pye Deferred (5/–)	25	25	41/3	−1/6	3 0 8
Radio & Tel. (2/–)	25	15	8/6	−1/–	3 10 6
Revo (10/–) ..	17½	20	55/6	−6d.	3 12 6
Reyrolle ..	12½	12½	82/6	..	3 0 8
Scophony (5/–) ..	—	—	11/–	−2/–	—
Siemens Ord. ..	7½	7½	37/–	−2/–	4 1 1
Strand Elec. (5/–)	10	12½	13/3	+3d.	4 14 4
Switchgear & Cowans (5/–) ..	20	20	27/–	..	3 14 0
T.C.C. (10/–) ..	10	12½	31/3	..	4 0 0

(*Continued on next page*)

* Dividends are paid free of Income Tax.

Company	Dividend Previous	Dividend Last	Middle Price July 19	Month's Rise or Fall	Yield p.c.
Equipment and Manufacturing (*Continued*)					£ s. d.
T.C. & M. ..	10	10	59/6	−1/6	3 7 4
TelephoneMfg.(5/−)	9	9	14/6	−3d.	3 2 1
Thorn Elec. (5/−)	20	20	38/3	+3/3	2 15 2
Tube Investments	20	22½	6¼	..	3 12 10
Vactric (5/−) ..	22½	Nil	19/−	−2/3	—
Veritys (5/−) ..	7½	7½	9/−	−3d.	4 3 4
WalsallConduits(4/−)	55	55	59/6	−½	3 14 0
Ward & Goldstone (5/−)	25	35	48/−	+5/−	3 13 0
Watford (2/−) ..	15	15	8/3	+6d.	3 12 10
WestinghouseBrake	14	14	79/−	..	3 10 9
West, Allen (5/−)	7½	7½	9/6	..	3 19 0
Traction and Transport					
Brit.Elec.Traction :					
Def. Ord. ..	45	45	1145	..	3 18 6
Pref. Ord. ..	8	8	182	−6	4 8 1
Calcutta Trams..	6½	7½	75/−	+9/6	2 0 0
Cape Elec. Trams	5	6	31/6	..	3 16 2
Southern Rly. :					
5% Prefd. ..	5	5	71½	−1	6 9 10
5% Pref. ..	5	5	115	−1	4 7 2
T. Tilling ..	10	10	53/6	−1/6	3 15 0
West Riding ..	10	10	43/9	..	4 11 4
Telegraph and Telephone					
Anglo-Am. Tel. :					
Pref.	6	6	133½	..	4 10 3
Def.	1½	1½	33½	..	4 9 7
Anglo-Portuguese	8	8	31/6	+6d.	5 1 7
Cable & Wireless :					
5½Pref. ..	5½	5½	114½	+1	4 16 0
Ord.	4	4	112½	+11	3 11 1
CanadianMarconi	$1 Nil	4 cts.	16/3	−¼	—
Globe Tel. & Tel :					
Ord.	8¼*	5*	46/−	+1/−	2 3 6
Pref.	6	6	33/6	+6d.	3 12 10
GreatNorthernTel. (£10)	20	18	32	..	5 12 6
Inter. Tel. & Tel.	Nil	Nil	26	−2	—
Marconi-Marine..	7½	7½	38/3	+1/3	3 18 5
Oriental Tel. Ord.	4	4	61/6	..	—
Telephone Props.	Nil	6	21/6	..	5 11 7
Tele. Rentals (5/−)	10	10	14/6	−6d.	3 9 0

* Dividends are paid free of Income Tax.

Stocks and Shares (*Continued from p.* 159)

risen during the past four weeks to £5, De la Rue to 12½, Falk Stadelmann to 50s. (a gain of 4s. 6d.), Metal Industries " B " to 50s., Ward & Goldstone to 48s., and International Combustion to 9¾. A few falls have occurred, some of them due to ex dividend or ex rights quotations.

C.I.C.

The Capital Issues Committee is gradually becoming a little more benevolent in the matter of giving permission for new issues to be made at prices which involve a bonus on the stock or shares to be offered to proprietors of the existing securities. When Johnson & Phillips proposed to make a new issue of shares, it will be recalled that permission to do so was refused by the C.I.C., on the ground that the element of bonus was too large. The Company thereupon proceeded to put forward a second plan—raising the price of the new shares and thereby reducing the value of the bonus to shareholders—the Committee persisted in its previous attitude and again frustrated the Johnson & Phillips intention.

More New Issues

Why this was done, it was then, and still is, difficult to explain. Issues have been made subsequently by other companies at prices that give at least as much bonus to proprietors. Recently the C.I.C. appears to have modified its attitude, and is now ready to permit shareholders to receive an element of bonus which, in the Johnson & Phillips case, the Committee declined to allow. Many companies are known to have in contemplation plans for expansion of their capital in order to go ahead with developments. Offerings of fresh capital at bonus prices are likely to become more frequent now that the C.I.C. has relaxed its previous austerity.

Canada's Power Production

DESPITE tremendous expansion to meet wartime needs, Canada now has little or no surplus of electrical power, said Mr. J. K. Wilson in his presidential address at the annual meeting of the Canadian Electrical Association on June 26th. He said that the drop in the consumption of power which was anticipated when war orders ceased had not materalized, indicating that Canada was still expanding industrially and that conversion from wartime to peacetime operations was proceeding smoothly. Mr. Wilson is manager of the merchandising division, commercial and distribution department, Shawinigan Water & Power Company.

At a time when the rising cost of living was occupying the attention of all Canada, no increase had been recorded in the cost of electrical power. Mr. Wilson outlined plans for the industry for great expansion in the field of rural electrification and stated that practically every utility company in Canada had plans for extension in this direction, which were limited only by the ability of the utilities to acquire man-power and material. At the turn of the century Canada had a generating capacity of 100,000 H.P.; by 1914 this had increased to 2,000,000 H.P. At the beginning of the 1939-45 war, the power capacity in Canada was 8,000,000 H.P.; it reached 10,250,000 H.P. before the end of the war.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1*s. each*) *may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.*2.

W. J. ABBOTT and J. Bell, Hills & Lucas, Ltd.—" Machines for sealing the ends of collapsible tubes by electric welding." 6537. April 7th, 1944. (578639.)

Belling & Lee, Ltd., C. W. Heath and K. J. Jones.—" Ambient temperature compensation for thermally-actuated electric switches." 18940. October 3rd, 1944. (578650.)

British Thomson-Houston Co., Ltd.—" Polyethylene glycol compositions." 13870/44. July 19th, 1943. (578540.) " Thermocouple apparatus for identifying metals." 9646/44. May 21st, 1943. (578569.) " Excess voltage protective devices of the spark gap type." 20915/43. December 16th, 1942. (578609.) " Electric circuits for transformers." 21400/43. December 26th, 1942. (578612.) " Washing machines." 1610/44. February 4th, 1943. (578637.)

A. C. Cossor, Ltd., F. M. Walker and E. E. Shelton.—" Fluorescent screens for electron bombardment." 20389. July 13th, 1939. (578582.)

Ericsson Telephones, Ltd., and H. J. Melton.—" Electrical multi-contact plugs." 21561. November 3rd, 1944. (578576.)

General Electric Co., Ltd., H. C. Turner and E. A. Fielding.—" Electrical filters." 14577. November 12th, 1941. (578512.)

M. E. Haine and Metropolitan-Vickers Electrical Co., Ltd.—" Circuits used in generating electric impulses." 9681. July 11th, 1942. (578514.)

M. E. Haine, J. M. Meek, J. D. Craggs and Metropolitan-Vickers Electrical Co., Ltd.—" Spark-gap electrical apparatus." Cognate applications 8826/41, 16432/41 and 8097/42. July 11th, 1941. (578510.)

W. T. Henley's Telegraph Works Co., Ltd., and W. F. O. Pollett.—" Fluxes for soldering." 26065. December 29th, 1944. (578578.)

Igranic Electric Co., Ltd.—" Electric motor control systems." 20861/43. December 12th, 1942. (578607.)

Landis & Gyr Soc. Anon.—" Thermally-operated electric switching device." 21238/43. December 21st, 1942. (578611.)

A. Mandl and Metropolitan-Vickers Electrical Co., Ltd.—" Direct current electric motors." 1410. January 25th, 1944. (578636.)

M-O Valve Co., Ltd., and W. E. Willshaw.—" Magnetrons." Cognate applications 4694/42 and 13152/42. April 9th, 1942. (578585.)

M-O Valve Co., Ltd., N. L. Harris and J. W. Ryde.—" Velocity-modulated generators, modulators, or amplifiers of electric oscillations." Cognate applications 7023/40 and 9563/40. April 18th, 1940. (578618.) " Velocity-modulated generators, modulators, or amplifiers of electric oscillations." 865/41. April 18th, 1940. (Divided out of 578618.) (578619.)

Patelhold Patentverwertungs und Elektroholding Akt.-Ges.—" Vacuum-tight seals for electrical apparatus." 5822/45. April 4th, 1944. (578580.)

F. A. Peachey and S. D. Berry.—" Electrical limiter circuits." 3726. February 29th, 1944. (578672.)

Plessey Co., Ltd.—" Electromagnetic vibratory interrupters." 11936/44. June 29th, 1943. (578536.)

J. C. Rees and C. H. Tobin.—" Fuse-holders, switch fuses and the like." 4175. March 7th, 1944. (578674.)

D. M. Smith and Metropolitan-Vickers Electrical Co., Ltd.—" Regenerative gas turbine plant." 14150. July 24th, 1944. (578686.)

Standard Telephones & Cables, Ltd.—" Radio apparatus for detecting and measuring the range of distant objects." 2994/42. February 24th, 1941. (578550.) " Ultra-high-frequency electronic devices." 9606/42. July 11th, 1941. (578586.) " Electron discharge devices of the electron velocity modulation type." 69/42. January 7th, 1941. (578620.)

Standard Telephones & Cables, Ltd. (International Standard Electric Corporation).—" Spark gaps for radio transmitters." 2773. February 15th, 1944. (578664.)

A. H. Stevens (Bouch Inventions, Ltd.).—" Luminescent tube lighting systems." 9456. June 11th, 1943. (578627.)

H. G. Watkins.—" Electric welding machine." 2869. February 16, 1944. (578667.)

Western Electric Co., Inc.—" Systems for transmitting guided electromagnetic waves." 18433/43. July 30, 1942. (578597.) " Systems for transmitting guided electromagnetic waves." 22914/45. July 30th, 1942. (Divided out of 578597.) (578617.) " High-frequency electron discharge systems." 9309/42. July 19th, 1941. (578655.)

Westinghouse Brake & Signal Co., Ltd., L. E. Thompson and A. Jenkins.—" Manufacture of alternating electric current rectifiers of the selenium type." 3915. March 2nd, 1944. (578673.)

Westinghouse Electric International Co.—" High-frequency electric heating systems." 17290/43. April 27th, 1943. (578556.) " Electron-discharge devices of the velocity modulation type." 11272/42. August 13th, 1941. (578587.) " Electron-discharge devices." 11386/42. August 20th, 1941. (578588.)

Amended Specification

567403. G. P. Dennis. " Electrical fuses."

New Refrigerator Factory

Kelvinator, Ltd., has announced the allocation of a quarter of a million sq ft of additional single-storey accommodation as the first major step in its programme of future expansion. These new premises are of the most up-to-date type built by the Government during the war, and are adjacent to the Rolls-Royce works at Crewe. Plans for the removal of a large part of the Kelvinator manufacturing organization are well advanced.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia.—October 17th. 15,000-kW steam turbine and accessories. Spec. 412 (£22 first copy, others 10s. 6d.). H. Baskerville, City Electric Light Co., Ltd., Boundary Street, Brisbane (*Tenders*).

Burnley.—July 29th. Electricity Department. Four-core and twin 660-V cables. (July 12th.)

Colchester.—August 23rd. Water Department. Three centrifugal pumps. (July 12th.)

Dundee.—August 10th. Corporation Education Committee. Various works, including electrical and welding equipment at building for pre-vocational courses in engineering. City quantity surveyor, 21, City Square.

Fraserburgh.—August 13th. Public Library Committee. Electric wiring of public library buildings. J. Noble, hon. secretary, Fraserburgh Public Library Committee, 51, Mid Street.

Kincardine.—August 3rd. County Council. Electrical work at 18 houses, St. Cyrus. County architect's office, Stonehaven.

Manchester.—August 1st. Electricity Committee. 420-V switchgear at Stuart Street generating station. (July 12th.)

August 9th. Electricity Department. 33 kV, 11-kV and multicore control cables, Stuart Street power station. (See this issue.)

August 22nd. Pipework, supports, valves, and four motor driven pumps for Stuart Street power station. Two 10,000 kVA transformers for Sale substation. (See this issue.)

August 23rd. Public Health Department. Electric pumps. (See this issue.)

New Zealand.—September 10th. Public Works Department. One 5,000-kVA voltage regulating transformer for Nelson district.

Wilton.—August 31st. Town Council. Public lighting installation. Borough surveyor, Municipal Offices, Fugglestone House.

Yeovil.—August 22nd. Borough Council. Poles and electrical equipment in connection with trunk road lighting. (See this issue.)

Orders Placed

Atherton.—Urban District Council. Accepted. Cables (£1,597).—Edison Swan. Transformers (£1,447)—Ferranti.

Bedford.—Electricity Committee. Accepted. Cable (£3,206).—Siemens Bros. & Co. Switch house extension at Austin Canons (£2,750).—Samuel Foster. Extensions, 33-kV switchboard (£12,185).—A. Reyrolle & Co.

Dunfermline. — Town Council. Accepted. Electric lighting for 140 permanent houses, St. Leonard's Hill (£3,746).—J. D. & W. Hamilton.

Ealing. — Housing Committee. Accepted. Electrical installations in houses on the Northolt estate (£9,800).—Rawlings Brothers.

Electricity Committee. Renewed for twelve months:—Service cut-outs.—Siemens Electric Lamps and Supplies. E.h.v. and l.v. paper-insulated cables.—Enfield Cables.

Glasgow.—Health Committee. Accepted. Installation of two lifts at Southern General Hospital (£389 each) and one at Eastern District Hospital (£615).—Waygood-Otis.

Islington. — Baths Committee. Accepted. Electric motors (£10,705).—J. J. Lane, Ltd.

Newcastle-on-Tyne.—City Council. Accepted. Four more sets of mercury arc rectifiers (£17,647).—Hewittic.

Portland.—Electricity Committee. Accepted. Cable for street lighting.—Pirelli-General.

St. Marylebone.—General Purposes Committee. Accepted. Automatic internal telephone system in Town Hall (£4,567).—Reliance Telephone Co.

Seaham (Durham). — Urban Council. Accepted. Electric prepayment meters.—Sangamo-Weston and Met-Vick. Underground cable.—Henley's. Street lighting poles and equipment.—B.T.H. Co.

Electrical installations in 74 houses at Parkside.—J. Calvert.

Sheffield.—Electricity Committee. Accepted. Erection of cooling tower at Neepsend power station (£56,334).—Mitchell Construction Co.

Whitburn.—Town Council. Accepted. Street lighting (£1,225).—James Kilpatrick.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aireborough (Leeds).—Houses (32), Springfield Farm estate, Rawdon; F. Tunnell, Council's engineer and surveyor, Micklefield House, Rawdon.

Alloa.—Houses (166) for Town Council (£250,000); burgh surveyor.

Banstead.—Houses (35) for U.D.C.; Thorogood & Sons, contractors, 55, Bond Road, Surbiton.

Beaumaris.—Houses (70) for Town Council; J. Hughes & Son, builders, Sunnyside, Kingsland Road, Holyhead.

Bentley-with-Arksey.—Houses (192), Bentley Rise, for U.D.C.; Walter Firth, Ltd., contractors, Armthorpe Road, Armthorpe, Doncaster.

Blaydon-on-Tyne.—Factory for the Northern Bedding Co., Ltd.; Bewley & Scott, Ltd., Dunston-on-Tyne.

Boldon (Co. Durham).—Houses (100), Boldon Colliery; N. Hindmarsh, surveyor, Council Offices, East Boldon.

Cambridge.—Houses (150), Walpole Road; John Mowlem & Co., Ltd., builders, 21, Ebury Bridge Road, London, S.W.1.

Cardiff.—Houses (206), Ton-yr-ywen estate (£1,140 each); Walker Building Co. (Cardiff), Ltd.

Chatham.—Houses (36), Wayfield estate; R. L. Honey, borough surveyor, Town Hall.

Chelmsford.—Permanent houses (114), Melbourne Park estate; V. J. Willis, borough engineer and surveyor, Municipal Offices, Rainsford House, Duke Street.

Chesterfield.—Extensions, Markham Hostel; W. A. Derbyshire, architect, 26, Glumangate.

Croydon.—Two schools (£194,000) and kitchen block (£10,000), Ashburton estate; borough architect.

Daventry.—Greyhound sports stadium, Ashby St. Ledgers (£20,000); O. Sandercock, Long Buckley, Rugby.

Esher.—Houses (44) and twenty flats, Northfield Farm estate, Cobham; F. Edwardes, clerk of the Council, Council Offices.

Finchley.—Flats (42), Woodlands estate, High Road, N.12; P. T. Harrison, borough engineer, 294-296, Regent's Park Road, Finchley.

Fulham.—Flats (172), Burnthwaite Road; borough engineer.

Glasgow.—Factory, Hawthorn Street; Edmiston, Brown & Co., Ltd.

Harpenden.—Houses (50) for Town Council; J. Jarvis & Sons, Ltd., builders, Buckingham Palace Gardens, London, S.W.1.

Holyhead.—Houses (90), Newry Fields and London Road sites; R. E. Price, surveyor, Town Hall.

Ipswich.—Houses (42), Rushmere Hall Farm estate; E. McLauchlan, borough surveyor and water engineer, Town Hall.

Islington.—Block of dwellings, Canonbury estate (£53,750); Davis Contractors, Ltd.

Lancashire.—Modern school, off School Lane, Skelmersdale; A. T. Nicholson, county architect, Fishergate Hill, Preston.

Largs (Ayrshire).—Permanent houses (24) for Town Council; joint town clerks, Municipal Chambers.

Leith.—Reconstruction, Leith Sailors' Home (£25,000); superintendent.

Lewisham.—Flats, with lifts and communal laundry, Thornford Road; borough engineer, Town Hall, Catford, S.E.6.

Liverpool.—Additions and alterations, Anfield Technical Institute, Belmont Road; city architect, Blackburn Chambers, Dale Street, Kingsway.

Lochmaben.—Cottage type houses (34); Town Clerk, Town Hall.

Longbenton.—Houses (30), at Wideopen; U.D.C. surveyor, Council Offices, Forest Hall, Northumberland.

Lydney.—Houses (26) for R.D.C. (£29,100); S. J. Kear & Sons, Ltd., Broadwell, near Coleford.

Manchester.—Factory, Buxton Street off London Road, for T. C. Thompson, Ltd.; B. Pendleton, architect, 16, Brazennose Street, Manchester, 2.

Mansfield.—Houses (72), Goodacre estate (£90,910); Whitehead (Public Works), Ltd., Cedar Street.

Marple.—Houses (30), Willow Farm (£33,490); E. D. Maddocks, Ltd., builders, Regent Road, Heavily, Stockport.

Melksham.—Houses (60) for U.D.C.; Surveyor's Office, Town Hall.

Middlesbrough.—Houses (120), Cumberland Road; Middlesbrough Building Trades Association, contractors.

Additions, Town Hall (£25,000); J. A. Kenyon, borough engineer.

Newmarket.—Permanent houses (50), Heath Lodge; H. G. Kenyon, architect, Council Offices, Stratford House.

Newport (I.W.).—Houses (86), Melbourne Park; E. L. Smith & Son, architects, Melville Chambers, Sandown.

Normanton.—Houses (60), Benson Lane and Dalefield Road; W. Jackson, architect, The Mount, Snydale Road, Normanton.

Padiham.—Community and youth centre for Lancashire Education Committee; G. N. Hill, county architect, County Offices, Preston.

Queensferry.—Houses (54) for the Town Council; surveyors, C. R. Douglas & Co., 15, East Port, Dunfermline.

Reigate.—Houses (52), Battlebridge Estate (£67,860); Wests (Redhill), Ltd.

Runcorn.—Houses (90), Helsby, for R.D.C.; surveyor, Council Offices, Castle Park, Frodsham, Cheshire.

Sale.—Houses (24), Carrington Lane site; J. E. Dean & Sons, builders, 37, Barkers Lane, Ashton-under-Lyne.

Seaham.—Houses (88), Leechmere Crescent; W. Leech, builder, 2, Clayton Street, Newcastle-on-Tyne.

Seaton Valley.—Houses (30), at Shiremoor; U.D.C. surveyor, Council Offices, Seaton Delaval.

Silsden.—Houses (34), Bradishaw Road estate; surveyor, Council Offices.

Skelton and Brotton (Yorks).—Houses (56), at Bonsbeck; U.D.C. surveyor.

Stone.—Houses, Eccleshall and Tittensor (£33,774); Madew & Wardle, Ltd., builders, Central Works, Market Lane, Newcastle, Staffs.

Sutherland.—Houses (72) for County Council; E. W. Brannen, architect, Carnegie Buildings, Dornoch.

Sutton and Cheam.—Houses (22), Pylbrook housing site, Sutton; N. H. Michell, borough engineer and surveyor, Municipal Offices.

Tadcaster.—Houses (48), Astley Lane and Church Lane; Needham & Thorpe, architects, 3, Duncombe Place, York.

Thetford.—Houses (40) for Town Council (£48,273); W. Sindall, builder, Gloucester Street, Cambridge.

Tottenham.—Extensions, St.Catherine College, Queen Street; Society for Promoting Christian Knowledge, 9, Northumberland Avenue, W.C.2.

Tottington.—Houses (20), Moyse Avenue, Walshaw, for U.D.C. (£25,158); Building Contractors (Bury), Ltd., Castle Street, Bury.

Warminster.—Houses (44) for Town Council; S. W. Foster, Ltd., Coombend, Radstock.

West Hartlepool.—Houses (68), Seaton Lane; borough engineer.